LAWRENCE BERKELEY NATIONAL LABORATORY

ENVIRONMENT, HEALTH, AND SAFETY DIVISION

ENVIRONMENTAL SERVICES GROUP

SUMMARY REPORT FOR SUPPLEMENTAL TRITIUM MONITORING

DECEMBER 2002

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1.0 EXECUTIVE SUMMARY

This report presents results from a 13-month supplemental monitoring program performed by Lawrence Berkeley National Laboratory (Berkeley Lab) from April 2001 to May 2002 that collected and analyzed environmental samples for tritium. The program was carried out in response to a request from the United States Environmental Protection Agency (US/EPA) for Berkeley Lab to perform supplemental tritium monitoring of ambient air, soil, sediment, and surface water near the Lab's main site. The EPA's request stipulated that the supplemental monitoring be conducted with rigorous US/EPA Superfund-level quality assurance protocols and procedures so that the data could be used for Hazard Ranking System (HRS) scoring to determine if Berkeley Lab should be added to the National Priority List of Superfund sites.[1] In addition, to address public concerns over tritium levels in vegetation, Berkeley Lab collected and analyzed vegetation and plant-transpired water samples. To those ends, a *Tritium Sampling and Analysis Plan* was drafted that met the EPA requirements.[2]

In 2000, to enhance stakeholder involvement in the supplemental monitoring program, Berkeley Lab established the Environmental Sampling Project Task Force that consisted of representatives from 24 community groups and regulatory agencies. In 2000 and 2001, nine public task force meetings were held to discuss the sampling plan, and the members were requested to provide comments for revising or augmenting the sampling program.

The principal source of air tritium emissions and tritium in the environment at Berkeley Lab was the research activities at the former National Tritium Labeling Facility (NTLF). In September 2001, five months after the supplemental monitoring program had begun, the primary funding agency for the NTLF, the National Institutes of Health, announced that it would withdraw funding for operation of the NTLF. An orderly closure of the NTLF was begun in December 2001*. Therefore, the first eight months of the supplemental monitoring program were performed while the NTLF was engaged in active research and the following five months were performed after the NTLF operation ceased and the Facility was undergoing safe and orderly closure. During the 13-month supplemental monitoring period, the NTLF emitted about 16 curies of tritium to the atmosphere.

The results and supporting data from the supplemental monitoring were provided to the US/EPA. After reviewing the data, the US/EPA announced in July 2002 that the environmental sampling at the Lawrence Berkeley National Laboratory had found tritium levels well below federal health standards, and that no further action was required under the Superfund program.[3] Furthermore, the US/EPA changed the site's Superfund status from "potentially eligible" for listing to "no further federal response."

The results from the supplemental monitoring corroborate the large body of environmental tritium data that Berkeley Lab has previously collected and reported. Tritium levels in the environment are highest near the NTLF Hillside Stack, and even those levels are well below health hazard thresholds. As previously reported, the concentrations of tritium in the environment quickly decrease with distance. At a distance of 200-500 meters from the stack, the levels are at or near tritium detection limits for commercial analytical laboratories.

A comparison was made between the tritium concentrations measured under the supplemental monitoring program and the tritium concentrations predicted by the fate and transport model used in the *Environmental Health Risk Assessment for Tritium Releases at the National Tritium Labeling Facility at Lawrence Berkeley National Lab.*[4] The comparison determined that the tritium concentration data generated by the fate and transport model and used in the risk assessment are generally higher than levels measured during the supplemental monitoring period. For the environmental sample type (soil) where the level determined by the model is lower than the measured values, the associated exposure pathway is not a primary contributor to dose and risk.

In addition, an independent assessment by SENES Oak Ridge Inc. was performed on tritium-in-vegetation data collected for the supplemental monitoring program. The assessment determined that the levels of tritium in vegetation surrounding Berkeley Lab are far below levels for adverse impacts to the environment or human health. The assessment calculated that the maximum plausible human exposure to tritium contained in vegetation surrounding LBNL would result in a lifetime dose of less than 1 mrem and a cancer risk that is essentially zero.[5]

* In the *Summary Report for Supplemental Tritium Monitoring* that was distributed in December 2002, the third paragraph of the Executive Summary incorrectly stated that closure was begun in December 2002. The date has been corrected here to 2001.

2.0 BACKGROUND

Historically, the main source of air tritium emissions and tritium in the local environment at Berkeley Lab was the National Tritium Labeling Facility (NTLF). See Figure 2-1. The NTLF was formally established in 1982 and designated as a Department of Energy (DOE) National User Facility for tritium labeling research and development with funding provided by the National Institutes of Health (NIH). It operated for almost twenty years until December 2001, when NIH discontinued its funding for NTLF research activities. During its period of operation, emissions (air and water) and impacts on the local environs (ambient air, water, soil, sediment, and vegetation) from the NTLF were monitored as part of the Berkeley Lab routine environmental monitoring program. Results from the routine monitoring program are summarized annually in its *Site Environmental Report* and available on the Berkeley Lab website at http://www.lbl.gov/ehs/esg.[6]

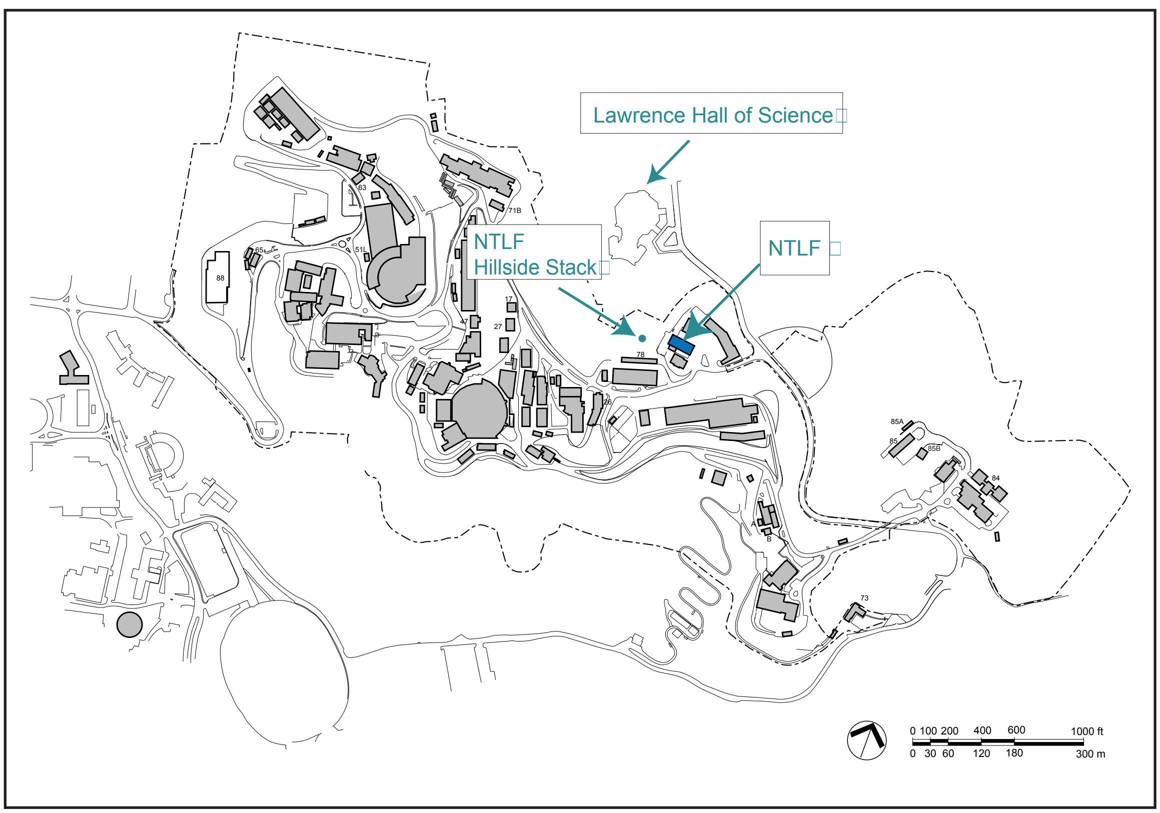

Figure 2-1 Berkeley Lab site map showing location of NTLF

In 1991, the United States Environmental Protection Agency (US/EPA) initially evaluated Berkeley Lab under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)[7] for possible inclusion on the federal Superfund List. US/EPA determined at that time that Berkeley Lab did not qualify as a Superfund site. In 1997, the Committee to Minimize Toxic Waste (CMTW), a Berkeley-based community group, formally requested that US/EPA review additional data regarding tritium contamination and re-evaluate Berkeley Lab for possible listing as a Superfund site. In re-evaluating Berkeley Lab, US/EPA considered data submitted by CMTW and the DOE. US/EPA issued a preliminary Superfund evaluation report in July 1998, with a finding that Berkeley Lab was potentially eligible for the National Priorities List (NPL) because of the tritium levels in ambient air that were reported by Berkeley Lab. US/EPA recognized, however, that although the tritium levels in air sometimes exceeded Superfund screening criteria, they were well below its National Emission Standards for Hazardous Air Pollutants (NESHAPs).[8]

In the July 1998 report, US/EPA stated that while the operation of the NTLF resulted in detectable but small levels of tritium in nearby soil, groundwater, and surface water, the data do not show tritium concentrations in sufficient quantities to necessitate action for remediation. Nevertheless, US/EPA requested supplemental sampling to support a final decision.

In September 1998, US/EPA requested that the supplemental samples of ambient air, soil, sediment, and surface water be collected consistent with US/EPA Superfund guidance, and that Berkeley Lab consider input from local stakeholders in planning the program. These sample data would be used by US/EPA to determine the nature and extent of present tritium contamination in the environment surrounding Berkeley Lab, and they would enable US/EPA to make a final decision as to whether or not Berkeley Lab was to be eligible to be listed on the NPL.[9]

In response to US/EPA's request, Berkeley Lab prepared a draft *Tritium Sampling and Analysis Plan*, which was submitted to the US/EPA in May 1999.[2] The plan included the following documents:

- *Quality Assurance Project Plan (QAPP) for Tritium Sampling*
- *Ambient Air Sampling Plan for Tritium*
- *Soil, Sediment and Surface Water Sampling Plan for Tritium*,
- *Vegetation Sampling Plan for Tritium*
- *Berkeley Lab Standard Operating Procedures for Environmental Monitoring*
- *Analytical Laboratory Standard Analytical Procedures for Tritium Analysis*
- *Example Data Package*

To provide sufficient monitoring information, Berkeley Lab proposed to take samples in a variety of environmental media. Because the primary human exposure pathway is air, the sampling plan presented a methodology for acquiring additional ambient air samples beyond the existing routine ambient air monitoring program. To assure that potential secondary exposure pathways were considered, US/EPA also recommended that samples be collected in soil, sediments, and surface water. To address public concern over tritium levels in vegetation, Berkeley Lab also proposed collecting samples of vegetation and plant-transpired water.

In order to enhance stakeholder involvement in the development and implementation of the *Tritium Sampling and Analysis Plan*, Berkeley Lab established the Environmental Sampling Project Task Force, consisting of representatives from 24 stakeholder groups. In 2000 and 2001, nine public task force meetings were held and the members were requested to review the draft sampling plan in detail, and to provide comments for revising or augmenting the sampling program.

Based on Task Force members' comments and community input, the *Tritium Sampling and Analysis Plan* documents were revised and resubmitted to US/EPA and DOE in January and February 2001 for concurrence and approval. US/EPA concurred with the plan, and DOE approved the plan in 2001.[9, 10, 11] Sampling began in April 2001 and was completed in May 2002.

Although research activities ceased in December 2001, low levels of tritium emissions continued to occur from the NTLF due to clean-up activities, a catalytic oxidation study and normal baseline emissions emanating from laboratory equipment. During the sampling period of April 2001 to May 2002, NTLF stack air tritium emissions totaled about 16 curies, which was about 67% of the total emissions in calendar year 2000 (24 curies).[12] Figure 2-2 shows a plot of weekly NTLF stack air emissions from April 2001 to May 2002.

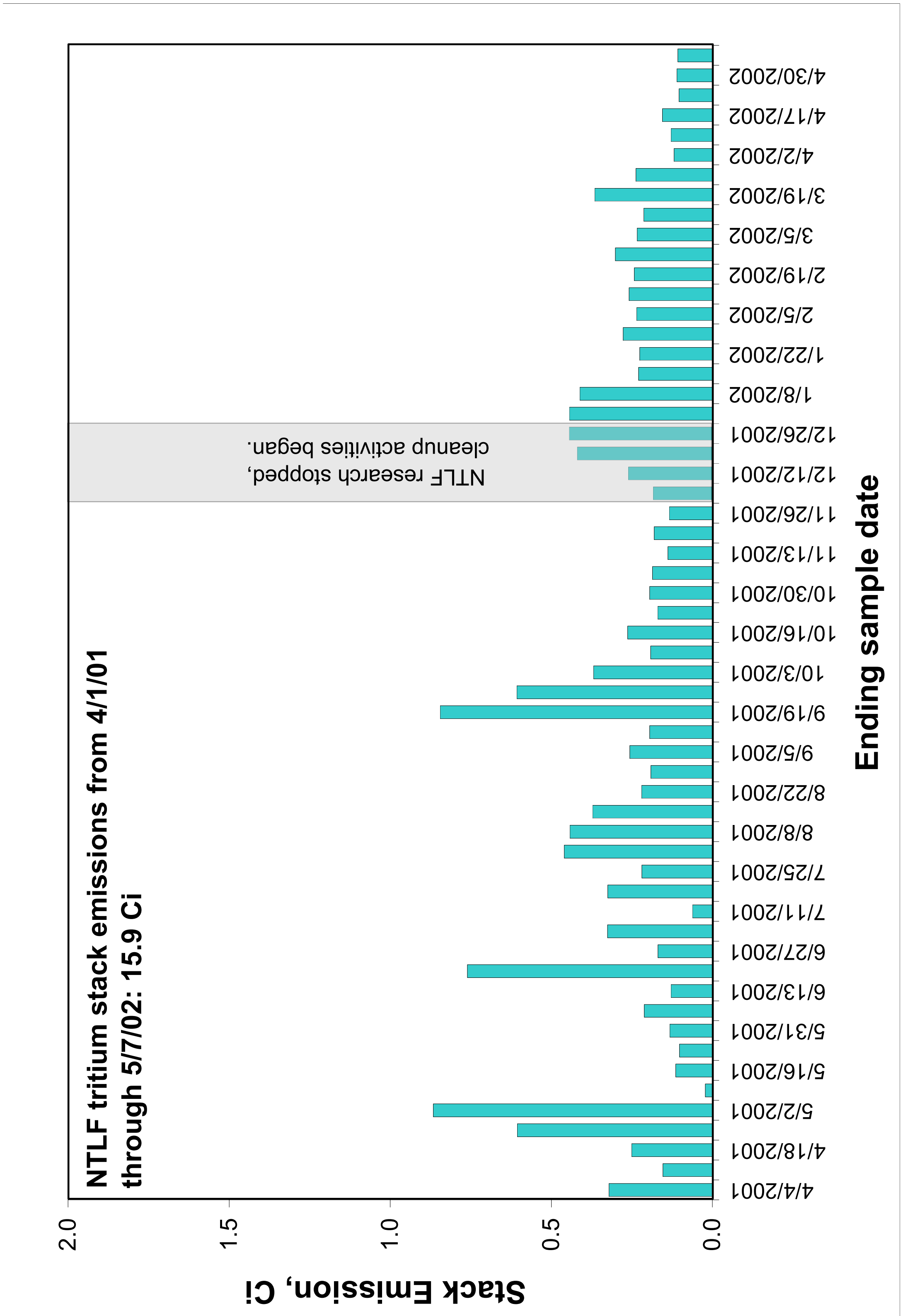

Figure 2-2 National Tritium Labeling Facility (NTLF) Tritium Stack Emissions, April 1, 2001 through May 5, 2002

2.1 OBJECTIVES OF SUPPLEMENTAL TRITIUM MONITORING

The primary objectives of the supplemental tritium monitoring were identified in the *Tritium Sampling and Analysis Plan (TSAP)*.[2]

- Collect data of the appropriate type and quality for US/EPA to decide whether to place Berkeley Lab on the NPL of Superfund sites
- Evaluate the potential for adverse impact on human health or the environment from vegetation as a result of Berkeley Lab tritium activities. Compare tritium-in-vegetation data collected for the supplemental monitoring program with data generated by tritium fate and transport model used in the *Environmental Health-Risk Assessment for Tritium Releases at the National Tritium Labeling Facility at Lawrence Berkeley Lab*[4]

Other objectives included public participation in program development and observation of sampling activities by the public. Those objectives are discussed within the individual sample matrix sections later in this report.

2.2 SAMPLING, ANALYSES AND DATA QUALITY

The supplemental sampling defined in the TSAP built on and extended beyond the ongoing routine environmental monitoring program that Berkeley Lab has conducted for many years. The supplemental monitoring program followed EPA's data quality objective process[13] and was designed to meet all the objectives of the Hazard Ranking System (HRS) scoring system used by EPA to support NPL decisions.[14, 15] Samples were collected both from areas near the NTLF where maximum concentrations have been measured and from areas away from the NTLF, where concentrations would be expected to be less, but where potential receptors (people) exist. Samples were collected from all target distances and locations needed required by the US/EPA to complete the HRS scoring. A tiered sampling plan was designed for soil and sediment samples. Additional samples (Tier 2) were to be collected if the initial samples (Tier 1) exceeded a specified health-protective concentration benchmark. None of the Tier 1 samples exceeded these benchmarks, and therefore no Tier 2 sampling was needed.

Within the TSAP, data quality objectives (DQOs) were designed to ensure that the type, quantity, and quality of environmental data used in the decision-making process were appropriate for the intended application.[13] DQOs are the qualitative and quantitative statements derived from the outputs of each step of the DQO process that:

- Clarify the study objective
- Define the most appropriate type of data to collect
- Determine the most appropriate conditions under which to collect the data
- Specify acceptable levels of decision errors that will be used as the basis for establishing the quantity and quality of data needed to support the decision

DQOs were used to develop a scientific and resource-effective sampling design.

2.3 DATA REVIEW, VALIDATION AND VERIFICATION

All data were validated in accordance with EPA's Superfund data validation requirements. After field sampling activities were completed, field reports and chain-of-custody forms were reviewed to assess compliance with the technical requirements specified in the TSAP. The records of field data collection and laboratory reports were reviewed to determine if the laboratory reporting was accurate and complete and to assess conformance with quality control requirements specified in the plan. Comprehensive analytical laboratory data packages were generated that documented quality control performance indicators. A *Data Verification and Validation Plan*[16] was developed, approved and implemented. All of the data packages were validated by Berkeley Lab staff. Over 10% of the data packages were also fully validated by an individual who was independent of data generation. Individual analytical results were validated against the acceptance criteria specified in the *Data Verification and Validation Plan*.

If results of duplicate or split samples were outside the acceptance criteria specified in the plan, the results were reviewed and evaluated. Duplicate and split sample results outside the acceptance criteria established in this plan in some cases did not invalidate data, because of inherent sample matrix variability and difficulties preparing homogenous samples to split.

3.0 AMBIENT AIR MONITORING

In order to provide information for HRS scoring of the ambient air pathway, monthly ambient air sampling under this program began on May 1, 2001 and continued through May 7, 2002.

3.1 SAMPLE COLLECTION METHODS

Tritium released from the NTLF was mostly in the form of tritiated water vapor (HTO). To sample HTO in air, Berkeley Lab's ambient monitoring systems collected water vapor in ambient air, by drawing air through a column of silica gel at a rate of 100 cubic centimeters per minute (cm^3/min) (0.0035 cubic feet [ft^3]/min). Each column contained 380 grams (g) (0.084 pounds [lbs]) of dry color-indicating silica gel.[17] This type of silica gel changes color when it absorbs moisture, thus indicating the amount of saturated silica gel in the column. The sampling systems were designed and the columns were sized for excess capacity based on projected sample air volume, and typical atmospheric humidity conditions. These systems were operated continuously, with the silica gel columns exchanged on the first Tuesday of each month by Berkeley Lab staff. Each site was inspected weekly between these sample exchanges to verify that systems were operating correctly. During the weekly field checks, the silica gel was inspected for color to quickly confirm operation of the sampler and that the silica gel was not saturated.

Once collected from field locations, the columns were transported to a clean facility on site where the silica gel was split equally into two parts, referred to as the sample and split fractions. The splitting (into equal fractions) was performed with the use of a electronic balance. During splitting, the color of the silica gel was inspected again to determine if saturated conditions existed. The split fraction was used for quality assurance purposes in one of several ways. Berkeley Lab's routine quality control objective is to analyze a minimum of 10% of the split fractions from the network. Berkeley Lab used the services of three analytical laboratories and applied this quality assurance criterion (i.e., minimum 10%) to each laboratory. The three laboratories were Eberline Services (ES) in Richmond, California; Lawrence Livermore National Laboratory's Chemical and Materials Science Environmental Services (CES); and US/EPA's National Air and Radiation Environmental Laboratory (NAREL) in Montgomery, Alabama. After each sampling period, all of the sample fractions were sent to ES. Two split fractions were sent to ES, and 3 split fractions were sent to both CES and NAREL. Berkeley Lab retained the remaining split fractions for backup purposes.

All three laboratories used liquid scintillation counters to determine tritium levels in the extracted moisture from the silica gel. The method of extraction varied with each laboratory. Eberline Services used an azeotropic extraction technique. Contractual reporting detection limits were equivalent to 0.2 becquerels per cubic meter (Bq/m^3) (5 picocuries [$pCi]/m^3$) of sampled air. NAREL used a distillation method to extract the moisture. This provided a slightly more sensitive detection limit of about 0.1 Bq/m^3 (2 to 3 pCi/m^3). CES had the capability of detecting tritium at ultra-low levels (0.03 Bq/m^3 [0.7 pCi/m^3]) by freeze-drying the silica gel to extract the water and then measuring the extract in an ultra low-level counting facility. US/EPA requested that Berkeley Lab use the ultra-low detection capabilities of CES to assist in establishing the regional background level of tritium.

All members of the Environmental Sampling Task Force, including the US/EPA and interested members of the public were invited to observe the sample collection and handling activities.

3.2 SAMPLE LOCATIONS

Supplemental ambient air monitoring began in May 2001 and continued for one year. Berkeley Lab expanded its monitoring network from seven to fifteen sites for this special period. Besides satisfying the objective of gathering representative data for US/EPA, the network expansion addressed a recommendation from the City of Berkeley's independent consultant that the Laboratory provide monitoring coverage in additional directions from the NTLF, even in downwind directions where the wind seldom blows. The 15 sites effectively covered all 16 compass directions (e.g., north, north-northwest, northwest), with most of the new sites at distances from the NTLF where detectable levels of tritium might be present even from small releases. Nearly all of the sites were located within 1 kilometer (km) (0.6 miles) of the NTLF. The station farthest from the Laboratory, ENV-AR, was located more than 2.2 km (1.4 miles) south-southeast at the East Bay Municipal Utility District's (EBMUD's) Amito Reservoir (an enclosed water tank). This site was selected as a regional background site because of its distance from the source of the tritium emissions and position outside of the predominant downwind wind patterns found near the NTLF. In other respects (elevation and meteorological conditions), the Amito Reservoir site is similar to that of the NTLF. Figure 3-1 depicts the locations of all stations in the network.

One hundred and seventy-nine out of a possible 180 sample fractions were analyzed during the supplemental sampling period. The only sample not analyzed during the period was the November sample from the University of California Botanical Garden ENV-UCBG site. The sampler at this location did not operate during this period because a fallen tree knocked down the power line serving the site.

3.3 ANALYTICAL RESULTS

Analytical results for sample and split fractions are tabulated in Appendix A. Statistical summaries of the sample fractions for the supplemental monitoring period are provided in Table 3-1 (split fractions are discussed in Section 3.4). At each location, the monthly average and maximum tritium concentration values from the supplemental monitoring period were below 5% of the alternative US/EPA NESHAPs standard for airborne tritium 56 Bq/m^3 (1,500 pCi/m^3).[18] This alternative standard is referenced here only for comparison to the measured air tritium concentrations. Berkeley Lab compliance with the NESHAP regulation has always been achieved by calculating the dose to the members of the public from airborne radionuclides using EPA approved computer models. The maximum value measured at all locations during the year of sampling was 3.34 Bq/m^3 (90 pCi/m^3) at ENV-75EG during the month of June. Nearly all other maximum values were roughly an order of magnitude lower. Average values for each site were then approximately half that of their respective maximum values.

Consistent with the historical data collected under Berkeley Lab's ambient air program, the greatest tritium concentrations were measured at stations nearest the Hillside Stack. Concentrations quickly decreased with distance. At a distance of 500 m (1,650 ft) from the stack, the air tritium concentrations were frequently nondetectable. Across the entire network, 49 of the 179 sample fractions (nearly 30%) had reported results below analytical detection limits.

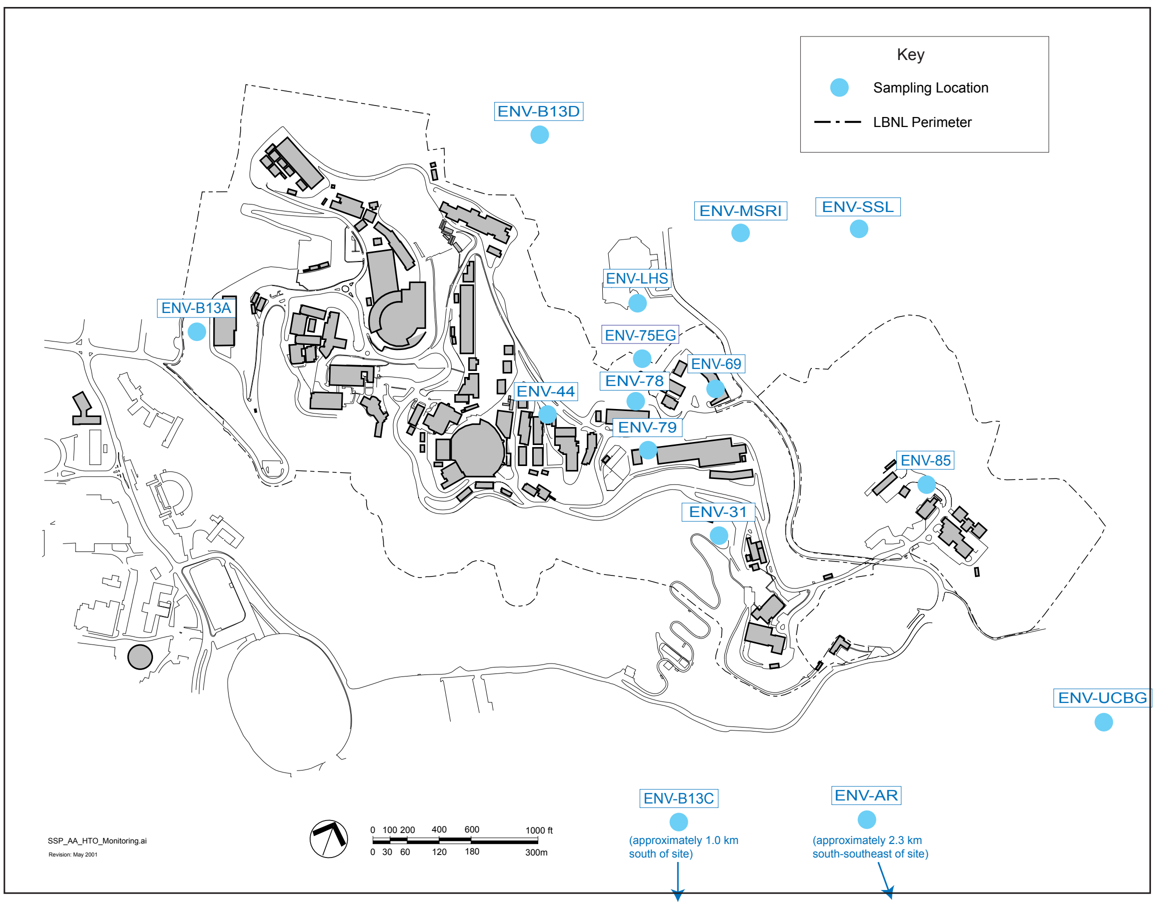

Figure 3-1 Ambient Air-Monitoring Network Sampling Locations

The spatial distribution of observed results is largely a function of interactions between the prevailing wind patterns, the extremely complex terrain of the site, and the variability in the tritium stack emissions during the sampling periods. Appendix B contains maps of the Berkeley Lab site with monitoring results plotted for each station in the network, and a wind chart that is based on hourly wind speed and direction information collected about 225 m (750 ft) away from the Hillside Stack. These figures correspond to each of the 12 months of supplemental ambient air sampling. Monthly tritium emissions (in the form of HTO) from NTLF operations are also noted on each plot. With rare exception, the observed results at each station appear to be correlated with the emissions, terrain, and wind patterns present during each sampling period.

The notable exceptions are the detectable tritium results at Amito Reservoir. This site was chosen with the expectation that impacts from NTLF emission levels typical of recent years would not be detected at this distance using commercially-available analytical methods and that any results detected by CES' ultra low analytical technique would reflect regional background conditions for tritium (Section 3.1 describes typical detection limits). Dispersion modeling with US/EPA-approved models support this hypothesis. Dispersion modeling suggests that ambient tritium levels at ENV-AR would generally be less than half that at ENV-B13C and tritium levels at ENV-AR would therefore consistently be below detection limits. In contrast, the ambient air measurements indicate that six of the twelve ENV-AR monthly samples analyzed by the commercial laboratory detected tritium. In four of these samples, the results were barely above detection limits, which could be attributed to uncertainties involved with the analytical methods (i.e., presence of tritium on the stock silica gel, analytical errors, sample handling practices). But the December (0.88 Bq/m^3) and February (0.57 Bq/m^3) results clearly represent positive measurements of tritium in the sample.

Examining the plots in Appendix B for the six months of anomalous results at ENV-AR, (i.e., May, August, October, December, February, and April), key indicators such as stack emissions, wind patterns, and analytical results observed across the network do not support the conclusion that tritium emissions from the NTLF contributed to the measurements obtained at Amito Reservoir. This is most apparent in the two months with the highest results, which ironically occurred after research at the NTLF stopped. During the December and February sampling, while tritium was measured at ENV-AR, none of the four upwind stations nearest this site (i.e., ENV's -B13C, -31, -85, and -UCBG) detected tritium. Wind patterns at the Laboratory most frequently transported tritium emissions from the Hillside Stack in directions away from Amito Reservoir. This fact was especially prevalent in December, yet this was the period with the site's greatest measured result.

Other aspects of Berkeley Lab's investigation into the anomalous Amito Reservoir results included examining the reservoir site and its surrounding area for the presence of any traditional source of tritium, reviewing sample handling procedures, and even testing fresh silica gel for the presence of tritium when the new product is first purchased. Berkeley Lab shared the findings of its investigation with US/EPA so that they could properly assess the impacts in its HRS evaluation of the NTLF. The California Department of Health Services (DHS) was informed as they have regulatory jurisdiction over non-DOE sources of radiological activity. To date, no additional conclusions have been made either by Berkeley Lab or DHS. While extensive efforts have been made to investigate the cause of the findings at Amito Reservoir, it is important to remember that the levels measured are extremely low and do not pose any threat to public safety or health.

Table 3-1 Summary of Supplemental Ambient Tritium Sampling

Station ID	Number of samples	Average (Bq/m^3)[a]	Average as percentage of standard[b]	Median (Bq/m^3)	Maximum (Bq/m^3)
ENV-B13A	12	< 0.13[c]	—	< 0.13[c]	0.24
ENV-B13C	12	< 0.12[c]	—	< 0.12[c]	0.32
ENV-B13D	12	0.14	—	0.12	0.42
ENV-31	12	<0.17[c]	—	<0.17[c]	0.32
ENV-44	12	0.25	0.45	0.25	0.51
ENV-69	12	0.46	0.82	0.42	0.88
ENV-75EG	12	1.74	3.11	1.44	3.34
ENV-77	12	0.62	1.11	0.51	1.95
ENV-78	12	0.92	1.64	0.80	2.20
ENV-85	12	<0.15[c]	—	<0.15[c]	0.31
ENV-AR	12	0.20	0.36	<0.12[c]	0.88
ENV-LHS	12	0.71	1.27	0.52	1.30
ENV-MSRI	12	0.36	0.64	0.34	0.84
ENV-SSL	12	0.25	0.45	0.16	0.69
ENV-UCBG	11[d]	<0.12[c]	—	<0.12[c]	0.23

[a] 1 Bq = 27 pCi

[b] Standard of comparison = 56 Bq/m^3 (source: 40 CFR61 Subpart H, Appendix E, Table 2)

[c] Statistic was below the highest value for analytical sensitivity (minimum detectable amount) measured for this site.

[d] One sample not obtained, see section 3.2.

3.4 QUALITY CONTROL RESULTS

In addition to the incorporating of Superfund required quality assurance, Berkeley Lab expanded its quality control program for ambient air supplemental sampling period in two specific areas; analysis of split sample fractions and analysis of blank samples. Berkeley Lab submitted two split fractions each month to ES, and three apiece to CES and NAREL analytical laboratories. This combined level of quality assurance exceeded the ambient air program's routine practice of performing split analyses on a minimum of 10% of the monitoring sites each month. A greater number of blank samples was also submitted to each of the analytical laboratories to better understand the potential contribution from factors such as the intrinsic concentration of tritium in the silica gel as it is received from the manufacturer and any tritium absorbed by the silica gel from sample handling practices during any brief exposure to the atmosphere during monthly changeout activities. Sample handling practices continued to follow those documented in routine standard operating procedures.[17]

The two primary metrics used to compare sample and split fraction results are the relative error ratio (RER) and the relative percent difference (RPD). The RER is defined as the difference between the sample and split results divided by the sum of the reported analytical error for the two fractions. An RER of less than one means that the two results compare acceptably.[19] The RPD is defined as the difference of the two results divided by the average of the two results times 100%. For pairs of fractions analyzed by the same laboratory, the acceptance criterion is a metric less than 33%. The RPD acceptance criteria increase slightly to 50% for pairs analyzed by different laboratories.[19] Exceeding one of these metrics does not automatically invalidate either of the results. Instead, it serves as a triggering mechanism for investigation into the cause of the different results.

A total of 24 sample and split fractions were analyzed by Eberline Services. The two sites selected for this comparison changed each month. All pairs satisfied the RER and RPD acceptance criteria. The average RER was 0.29. The average RPD was 14%.

With one more split fraction being sent each month to both CES and NAREL, this generated 35 and 36 paired comparisons, respectively. The sampler at ENV-UCBG, which did not operate during November because of a fallen tree, accounts for the difference in numbers. Because the CES analysis is more sensitive at detecting tritium, split fractions from two of the farthest sites from the Hillside Stack, Amito Reservoir (ENV-AR) and the University of California's Botanical Garden (ENV-UCBG), were always sent to the Livermore laboratory for analysis. To independently confirm results from the zones of highest expected tritium concentrations, split fractions from inside the eucalyptus grove (ENV-75EG) and from the historical NESHAPs maximally exposed individual site (ENV-LHS) were sent to EPA's laboratory each month for analysis. A third split fraction from an alternating different site in the network was sent to each laboratory each month. For the CES results, the average RER was 0.79 and the average RPD was

28%. The corresponding RER and RPD for the NAREL results were 0.71 and 18%, respectively. It is typical for RER and RPD values to be higher when the comparison is between sample pairs analyzed by different laboratories rather than by the same laboratory. A major reason for this is the different analytical methods and instrumentation used by the laboratories.

Of the 35 pairs where the split fraction was analyzed by CES, three pairs exceeded criteria for RER and RPD. In two of the instances, the CES result was below the ES detection limit for the pair. In the third case, the values from both labs were clearly above detection limits. Berkeley Lab's investigation found no reason to exclude either value based on individual sample parameters or batch quality assurance results. This case occurred at ENV-AR (farthest site from Berkeley Lab) during the month of February 2002, several months after the NTLF ceased research operations.

For the pairs analyzed by NAREL, only one of the 36 pairs fell outside interlaboratory quality assurance criteria. This was the February sample at ENV-B13D where the reported values both hovered around analytical detection limits. In fact, the ES result, while detectable, was below the laboratory's contractual reporting limit.

Figure 3-2 plots individual sample fraction results against corresponding split fraction results from all three laboratories. The dashed diagonal line represents the ideal match for these pairs. The shaded band represents the RPD acceptance criteria for the ideal match, assuming interlaboratory comparison criteria.

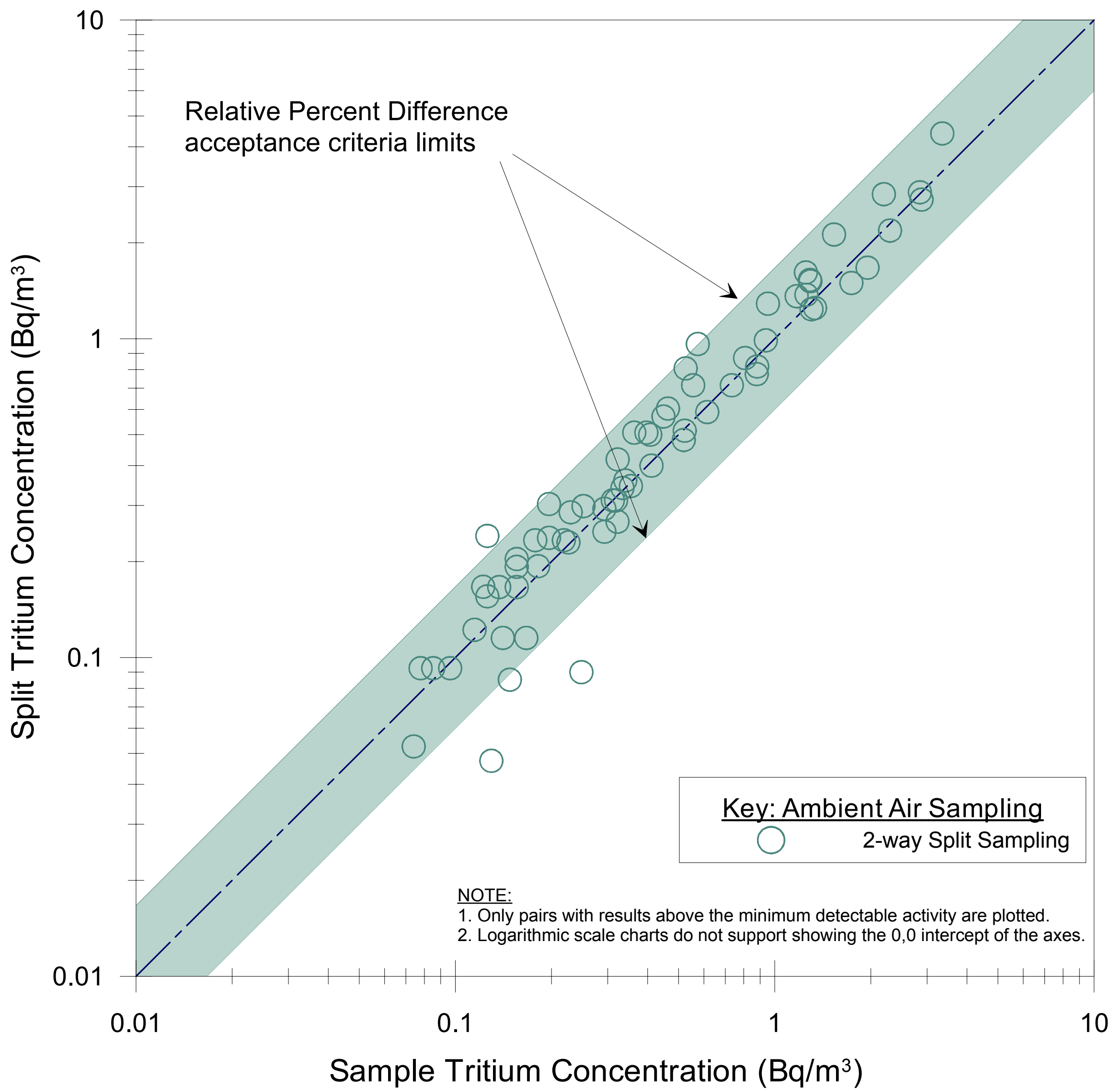

Figure 3-2 Comparison of Split Results for Tritiated Water in Ambient Air

4.0 SOIL MONITORING

Supplemental soil samples were collected from April 2 to May 4, 2001. Berkeley Lab proposed a two-tiered approach to collect the soil data required by EPA.[20] Tier 1 samples were collected to assess the magnitude and extent of tritium contamination in the soil. Tier 2 samples were to be collected based on two criteria, potential risk to human health and the need for additional data for HRS scoring. At locations where the Tier 1 sample tritium concentration was greater than 10% of the Preliminary Remediation Goal (PRG) for residential soil (40.7 Bq/g [1,100 pCi/g]), Tier 2 samples were to be collected. In addition, where tritium was detected at a concentration greater than the contractual reporting limit (RL) of 0.007 Bq/g [0.2 pCi/g] in the farthest sample collected from the Hillside Stack in a 30^{o} sector, Tier 2 samples were to be collected at greater distances to determine the extent of contamination. Based on the Tier 1 sampling results, no Tier 2 samples were required.

Members of the Environmental Sampling Task Force and interested members of the public were invited to observe the sampling.

4.1 SAMPLE COLLECTION METHODS

In accordance with requirements of the Hazard Ranking System Final Rule,[21] the soil sampling was designed to determine the distribution of tritium concentrations in the upper 0.6 m (2 ft) of soil. Samples were collected at two depth intervals at each sampling location: from 0.15 to 0.3 m (0.5 to 1 ft) and 0.45 to 0.6 m (1.5 to 2 ft). Two depth intervals were sampled to assess whether tritium concentrations in shallow soil were affected by seasonal variations in moisture content. At each location, nonsoil surface materials (e.g., grass, leaves) were removed, and then samples were collected using a soil drive-sampler loaded with a 15 cm long (6-inch) brass liner. Single-point (discrete) samples were collected at all locations. In addition, ten-point composite samples were collected at seven locations to address concerns expressed by the City of Berkeley regarding the representativeness of discrete samples. These samples were collected in accordance with HASL-300 guidance from the DOE Environmental Measurements Laboratory.[22]

Wherever duplicate soil samples were specified in the sampling plan, the duplicate was collected immediately adjacent to and at the same sample depth interval as the primary sample. Where split soil samples were specified, the sample was homogenized with a trowel in a dedicated decontaminated container. The homogenized sample was then divided with a trowel and the splits were transferred to wide-mouthed jars or brass tubes.

4.2 SAMPLE LOCATIONS

Sampling locations were selected to satisfy HRS data requirements, as specified in *Guidance for Performing Site Inspection Under CERCLA*.[23] In accordance with the approved sampling plan,[20] samples were collected at 64 locations up to a maximum distance of approximately 610 meters

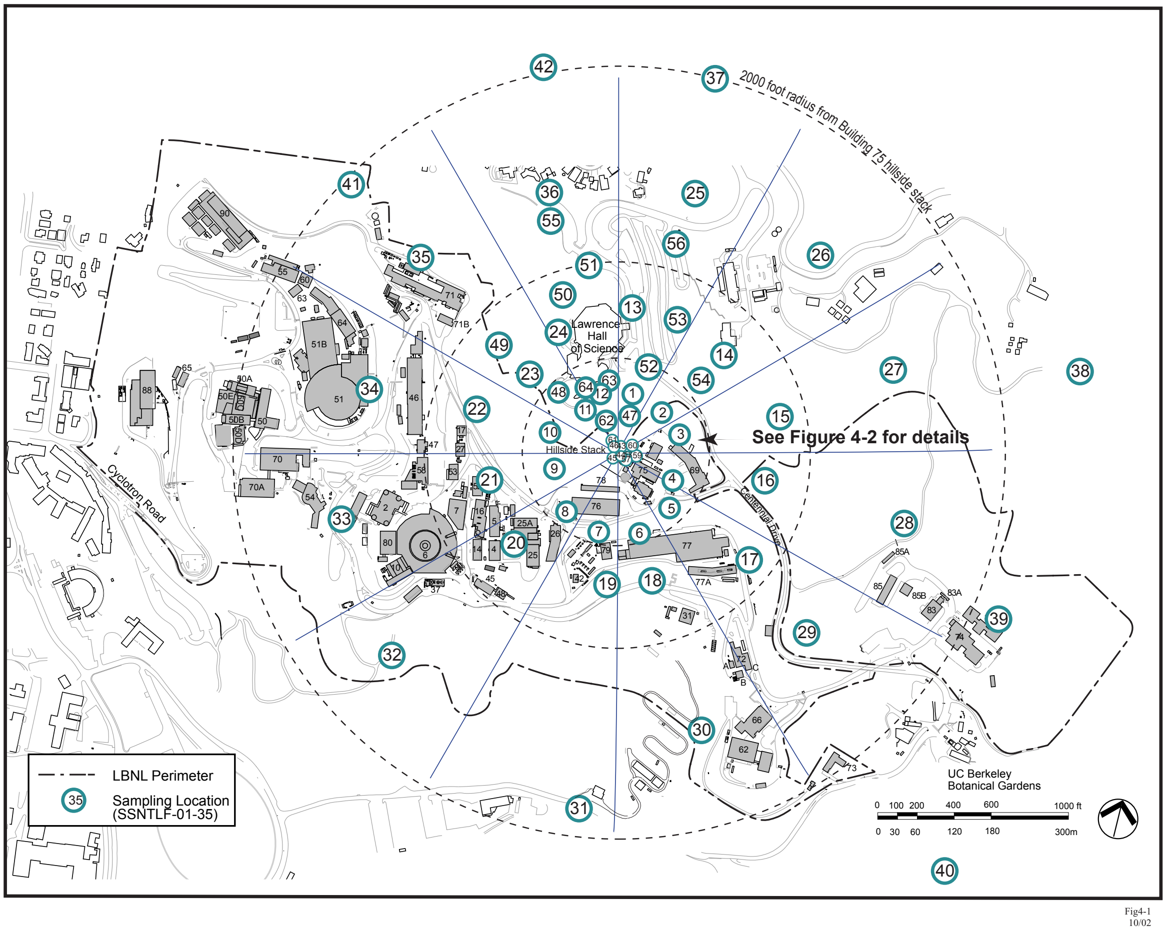

Figure 4-1 Supplemental Soil Sample Locations In and Around Berkeley Lab

(2,000 ft) from the NTLF Hillside Stack (Figures 4-1 and 4-2). In addition, background samples were collected at two locations approximately 1.6 kilometers (1 mile) northeast of the NTLF (sampling locations 65 and 66 on Figure 4-3). Coordinates and elevations of sampling points were determined using a global positioning system.

One suite of samples was collected from 36 locations dispersed in a radial pattern with respect to the Hillside Stack. Three concentric rings were located at distances of 152, 305, and 609 m (500, 1,000, and 2,000 ft) from the stack, and segmented with radii at 30° intervals into 36 elements. One soil sample was collected from within each element, as close to the center as possible (sample locations 1 to 36). A second suite of six sample locations (sample locations 37 to 42) was located at a distance of approximately 609 m (2,000 ft) from the Hillside Stack in the predominant downwind direction, and a third suite of samples was collected from four locations in a rectangular pattern near the base of the Hillside Stack (sample locations 43 to 46).

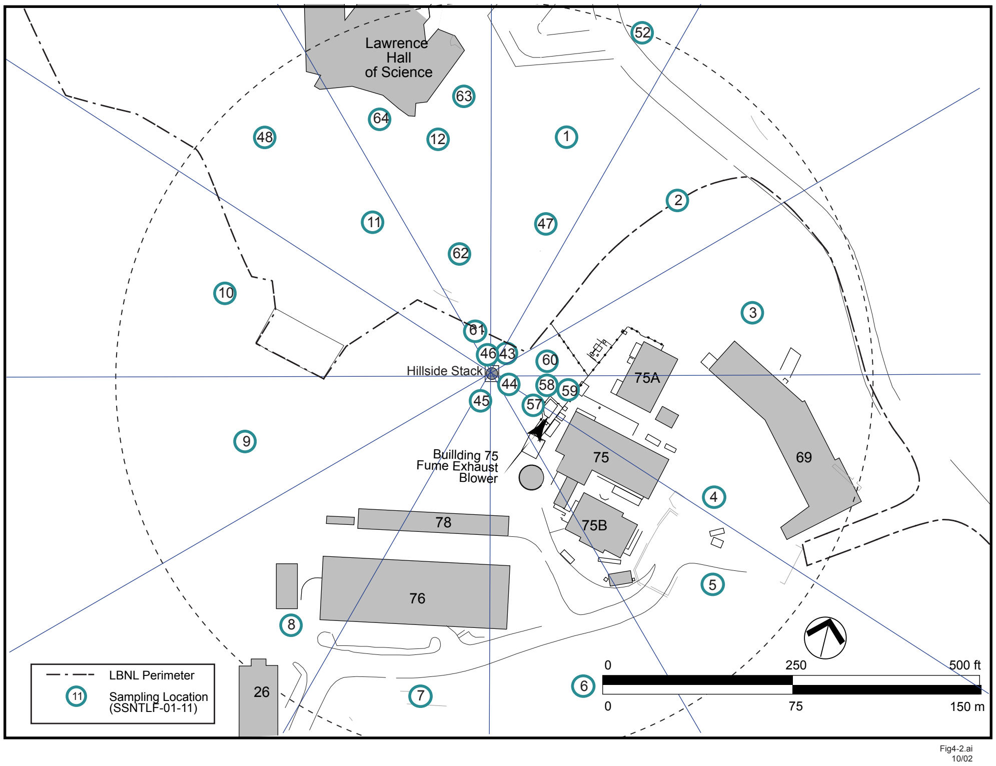

Figure 4-2 Supplemental Soil Sample Locations Near the NTLF Hillside Stack

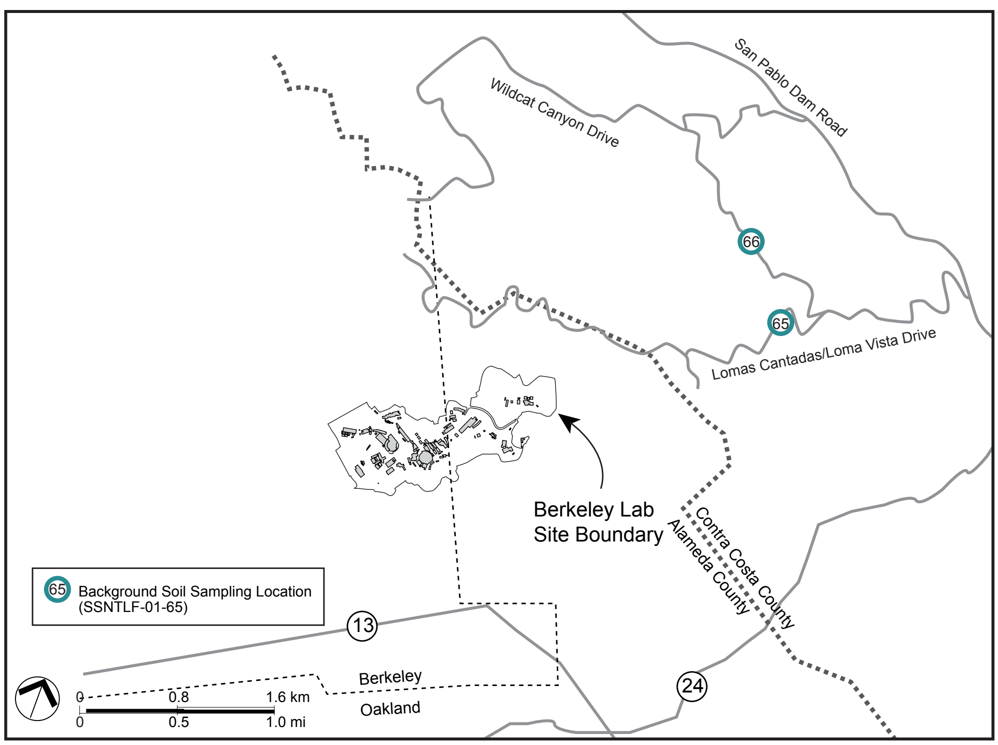

Figure 4-3 Supplemental Soil Sample Background Locations

Ten additional locations were sampled in the primary downwind direction near the Lawrence Hall of Science, in areas that are accessible to the public (sample locations 47 to 56). In response to a recommendation from the US/EPA, samples were also collected at eight locations near the Hillside Stack and in the area between the stack and the Lawrence Hall of Science, where elevated tritium concentrations had previously been detected in the soil (sampling locations 57 to 64).

4.3 ANALYTICAL RESULTS

A total of 238 soil samples were analyzed, including split and duplicate samples. Samples from all locations were analyzed for tritiated water (HTO). In addition, samples from five locations where soil tritium levels were historically highest were analyzed for HTO plus organically bound tritium [OBT]. Eberline Services (ES) in Richmond, California, analyzed the primary and duplicate samples. Split samples were analyzed by US/EPA's NAREL. For additional quality control (QC) purposes, most of the split samples (three-way splits) were also analyzed by the Berkeley Lab's Radiation Analytical Measurement Laboratory (RAML) or by Isotech Laboratories in Champaign, Illinois. The number and type of samples analyzed by the various laboratories are listed in Table 4-1.

Analytical results are tabulated in Appendix A. The distribution of tritium concentrations (HTO) in soil above the reporting limit is shown on Figure 4-4. The variation in HTO concentrations with distance from the Hillside Stack is shown on Figure 4-5. Maximum tritium concentrations were detected in the areas near the Hillside Stack, with concentrations decreasing to levels below the reporting limit (0.007 Bq/g [0.2 pCi/g]) beyond 136 m (446 Ft) of the stack. Tritium concentrations were above the reporting limit at 20 of the 64 sampling locations. The five locations where tritium was detected at a concentration greater than 0.037 Bq/g (1 pCi/g) were within approximately 49 m (160 ft) of the Hillside Stack. These results are consistent with the historical site data.

Table 4-1. Type and Number of Soil Samples Analyzed

Sample Type	Tritium Analysis Type	Primary Samples	Duplicate Samples	Split Samples	Split Samples (3- way split)	
Analytical Laboratory		ES	ES	NAREL	RAML	Isotech
Single Point	HTO	128	24	20	14	
	Total	10	2	2		
Background	HTO	4				
Composite	HTO	14		6	4	2
	Total	4		2		2

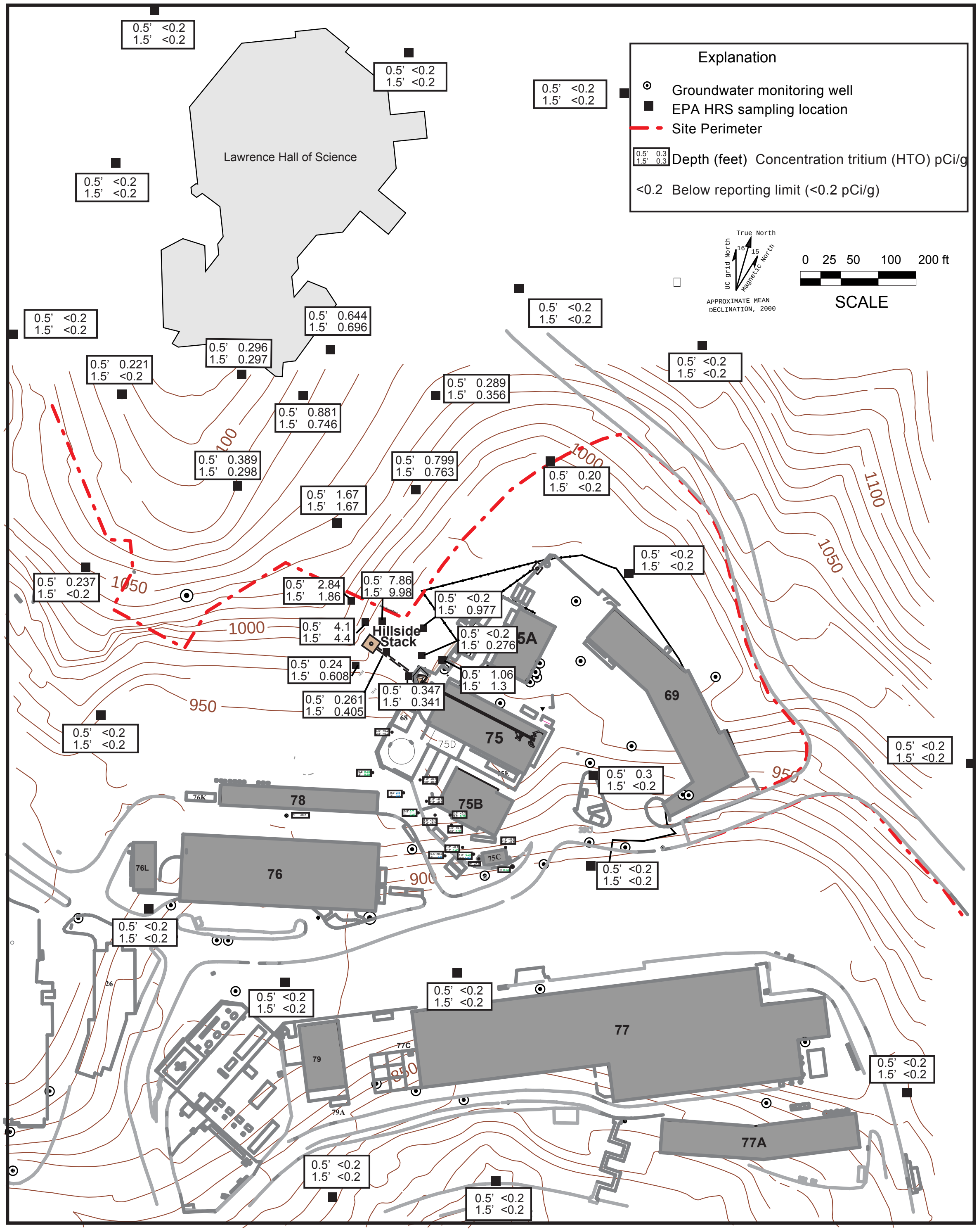

Figure 4-4 Concentrations of Tritium (HTO) in Soil Samples

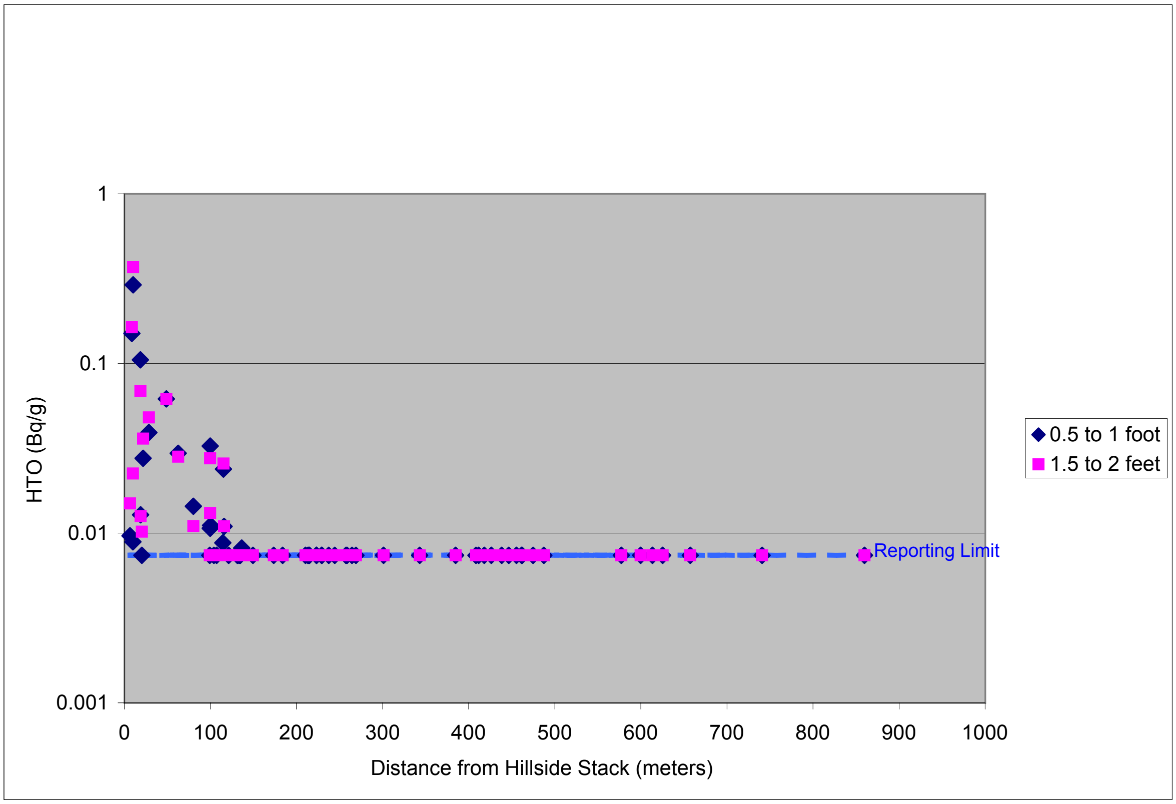

Figure 4-5 Variation in Concentration of Tritium (HTO) in Soil with Distance from the Hillside Stack

The maximum HTO concentration detected (0.37 Bq/g [9.98 pCi/g]) was observed at location 43, immediately adjacent to the stack. Total tritium was detected at a maximum concentration of 1.5 Bq/g (41.4 pCi/g) at the same location, but was below the reporting limit (0.185 Bq/g [5 pCi/g]) in the other samples for which it was analyzed. The maximum detected concentrations are more than two orders of magnitude below the PRG for tritium in residential soil (407 Bq/g [11,000 pCi/g]) set by US/EPA Region 9. The PRG for tritium is a concentration in soil associated with a one-in-a-million increased cancer risk.

Historically, the maximum concentration of HTO detected in soil has been 6.5 Bq/g (177 pCi/g) at a depth of 1.5 m (5 ft). The maximum concentration of HTO detected in the upper 0.6 m (2 ft) of soil has been 5.0 Bq/g (136 pCi/g). Both were detected west of Building 75, approximately 30 meters (100 feet) east of the stack. The maximum historical detection is almost two orders of magnitude below the PRG for residential soil.

4.4 QUALITY CONTROL RESULTS

As specified in the *Quality Assurance Project Plan* (QAPP), [19] field duplicate and split samples were to be collected for HTO analysis for approximately 20% and 10% of the soil samples, respectively. In accordance with the QAPP, 18% of the primary samples were analyzed as duplicates and 15% as splits. Fourteen of the twenty split samples collected were analyzed as three-way splits by three separate laboratories (ES, NAREL, and RAML). In addition, 43% of the composite samples were analyzed as three-way splits.

As specified in the QAPP,[19] both duplicate and split samples were to be collected for approximately 20% of the samples to be analyzed for total tritium. In compliance with the QAPP, 20% of the samples analyzed for total tritium were analyzed as duplicates and 20% as splits. In addition, 50% of the composite samples were analyzed as three-way splits.

Relative percent differences (RPD) and relative error ratios (RERs) were calculated for replicate sample pairs (field duplicate and split samples) where both results were above the minimum detectable activity. RERs were not calculated for split samples analyzed by US/EPA's NAREL since the laboratory information required to compute the RER was not available. A graphical summary of RPD results is shown in Figure 4-6 for split and duplicate soil samples. The acceptance criteria for replicate soil samples are an RPD less than 50% or an RER less than 1.[19]

The maximum concentration detected in the split samples that failed the RER test (0.01 Bq/g [0.3 pCi/g]) was only slightly above the reporting limit, indicating that the differences in detected concentrations were likely due to sample heterogeneity or differences in analytical techniques. See Figure 4-6. Based on the results, there is therefore no reason to exclude any of the primary sample results.

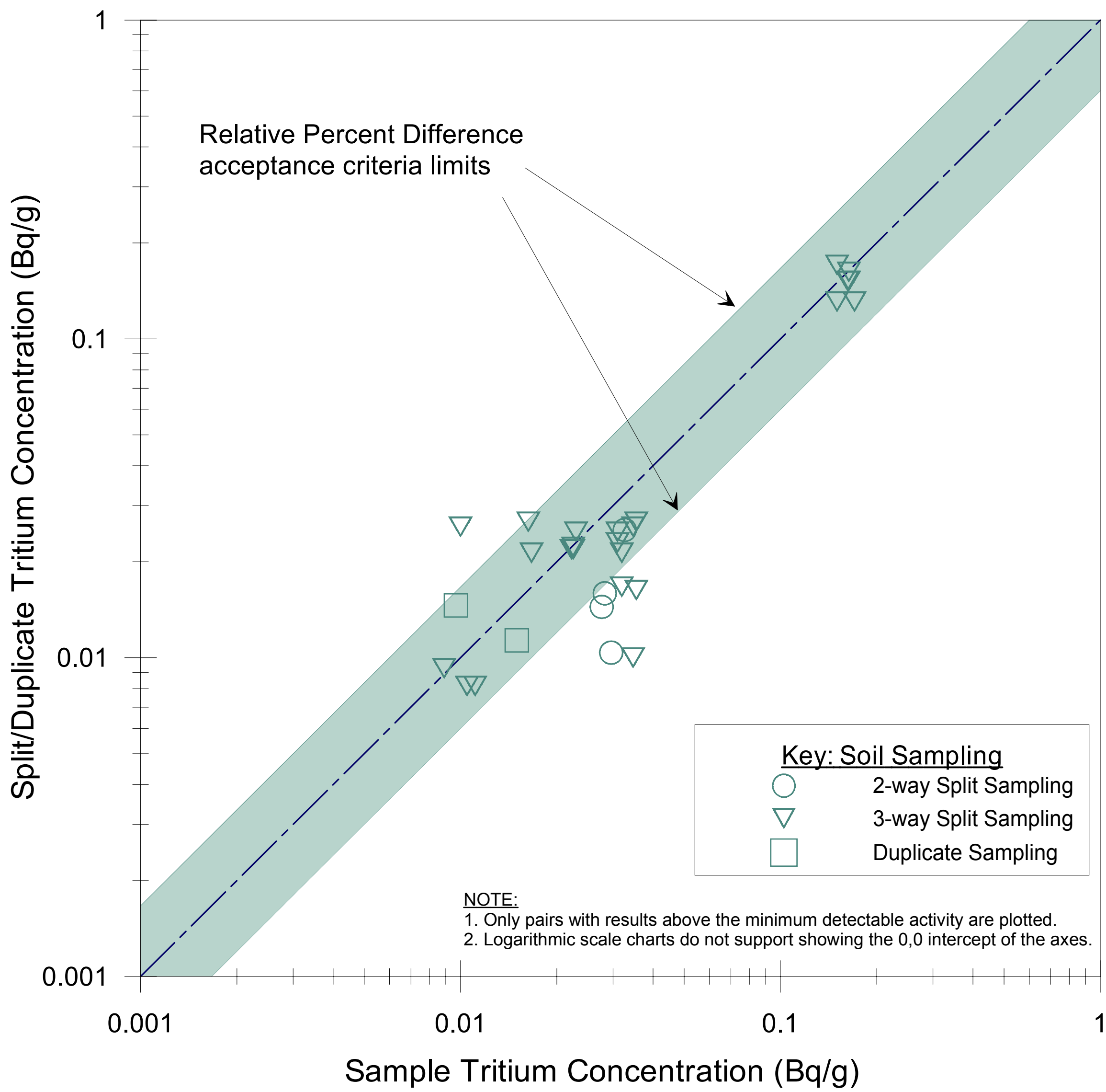

Figure 4-6 Comparison of Split and Duplicate Tritium Results for Soil Samples

5.0 SURFACE WATER AND SEDIMENT MONITORING

The objective of the surface water and sediment supplemental sampling was to provide information for HRS scoring of the surface water pathway. Sampling was designed to assess if the HRS surface water target, San Francisco Bay, has been impacted by tritium releases from the NTLF.

Surface water and sediment samples were collected from creeks that transport runoff from the site once in the dry season (August 31 or September 4, 2001) to monitor creek base flow conditions and once in the rainy season (April 9 or 10, 2001) to monitor the combination of base flow and surface runoff. In addition, surface water samples were collected monthly from October 2001 through April 2002 at selected locations to observe changes in tritium concentrations in the creeks due to variations in rainfall.

Members of the Environmental Sampling Task Force and interested members of the public were invited to observe the sampling.

5.1 SAMPLE COLLECTION METHODS

Sediment samples were collected from the creek bed by first removing organic debris from the surface and then scooping the sediment into a brass tube or glass jar. Surface water samples were collected by scooping the water directly from the creeks into glass jars.

5.2 SAMPLE LOCATIONS

Two watersheds drain the Berkeley Lab site: Strawberry Canyon Watershed and Blackberry Canyon Watershed. In the Strawberry Canyon Watershed, tributaries of Strawberry Creek carry runoff from the eastern part of the site southward into westward-flowing Strawberry Creek. These tributaries include Cafeteria Creek, Ravine Creek, Ten-Inch Creek, Chicken Creek, No Name Creek, Pineapple Creek, and Banana Creek (Figure 5-1). The Blackberry Canyon Watershed contains the westward-flowing North Fork Strawberry Creek, which carries runoff westward from the western part of the site. After merging on the University of California (UC) Berkeley campus, these creeks eventually discharge to San Francisco Bay.

Rainy season (April 2001) surface water and sediment samples were collected for tritium (HTO) analysis at two locations on Cafeteria, Ravine, Ten-Inch, Chicken, No Name, and North Fork of Strawberry Creeks; and at a single location on Banana and Pineapple Creeks. Two locations were selected for sampling to obtain a more accurate representation of concentrations of tritium in the surface water and sediment than could be obtained from a single sample, and to assess the variation in tritium concentrations in the downstream direction. A single sample was specified for Pineapple and Banana Creek because of the limited availability of appropriate sampling locations.

The sampling locations are shown in Figure 5-1. Samples were generally collected where surface water enters and/or exits the creek through the storm drain system. Dry season (August to September 2001) surface water and sediment samples were collected at the same locations, except that surface water samples were not collected from Cafeteria, Ravine, or Ten-Inch Creek, which were dry. Rainy and dry season surface water and sediment samples were also collected from Strawberry Creek at a location on the UC Berkeley campus and at the outfall to San Francisco Bay. Eleven sediment samples collected from Chicken and North Fork of Strawberry Creeks were also analyzed for total tritium. These creeks were selected because they were the locations where the highest concentrations of tritium had been detected in the surface water, and were therefore the most likely to have the highest total tritium concentrations.

In addition, surface water samples were collected monthly from October 2001 through April 2002 from Chicken Creek, North Fork of Strawberry Creek, and Strawberry Creek at a location on the UC campus and at the outfall to San Francisco Bay. Monthly rainy season samples were collected at these locations since they were considered the creeks most likely to receive tritium-contaminated runoff, and the concentrations of tritium previously detected in Chicken and North Fork of Strawberry Creeks have been the highest during the periods of maximum monthly rainfall.

Background rainy and dry season surface water and sediment samples were collected from two lakes outside the area influenced by the site (Lake Anza and Lake Temescal), about 1.5 miles north and south, respectively, of Berkeley Lab (Figure 5-2).

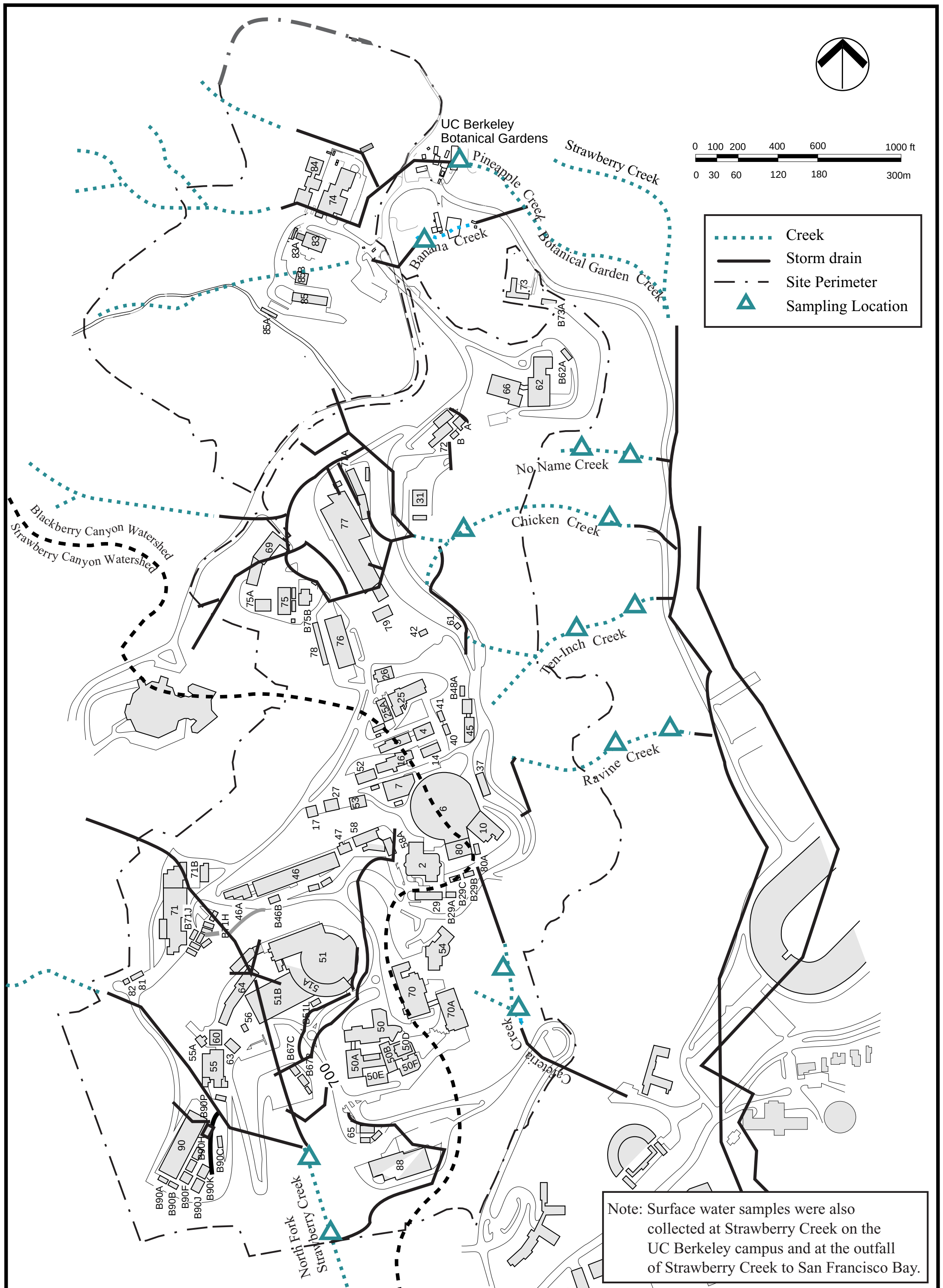

Figure 5-1 Supplemental Surface Water and Sediment Sample Locations On and Near the Berkeley Lab Site

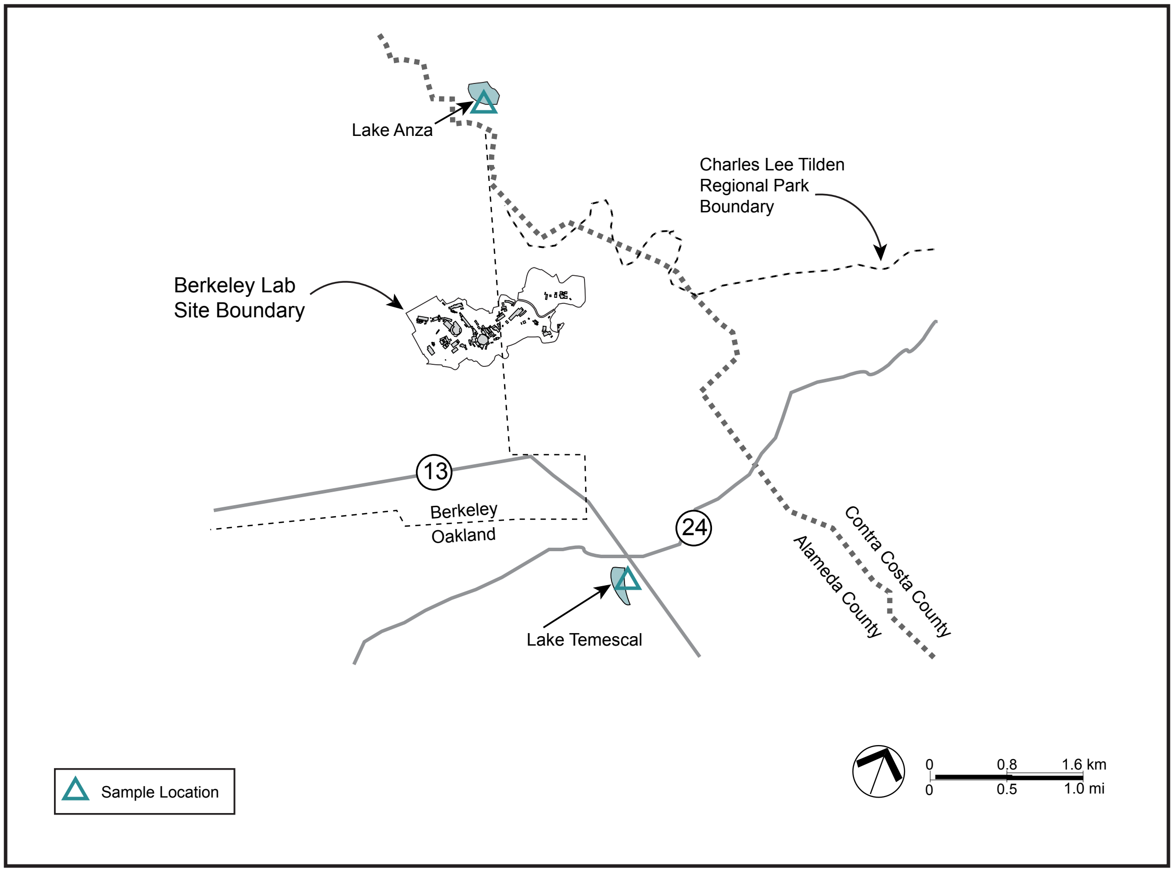

Figure 5-2 Supplemental Surface Water and Sediment Sample Background Locations

5.3 ANALYTICAL RESULTS

A total of 105 surface water samples and 50 sediment samples were analyzed for HTO, including split and duplicate samples. In addition, 11 sediment samples, including split and duplicate samples, were analyzed for total tritium (HTO and OBT). ES analyzed the primary and duplicate surface water and sediment samples. Split samples were analyzed by ES and either RAML or Isotech Laboratories. If samples were split three ways, they were also analyzed by NAREL. The number and type of samples analyzed by the various laboratories are noted in Table 5-1.

Table 5-1. Type and Number of Surface Water and Sediment Samples Analyzed

Sample Type	Tritium Analysis Type	Primary Samples	Duplicate Samples	Split Samples (3- way split)	Split Samples
Analytical Laboratory		**ES**	**ES**	**NAREL**	**RAML or Isotech**
Surface Water	HTO	72	17[a]	7	9
Sediment	HTO	36	6	4	4
	Total	6	2	1	2

[a] One duplicate sample was analyzed by NAREL

Analytical results are tabulated in Appendix A. Of the 50 sediment samples collected, tritium (HTO) was at or above the contractual reporting limit (RL) in only the April sample from Banana Creek. Tritium was detected at the RL (0.007 Bq/g [0.2 pCi/g]) in the Banana Creek sample, but was below the RL in the corresponding duplicate sample. Tritium (HTO) was not detected in the sediment samples collected at the background sampling locations; at Strawberry Creek on the UC Berkeley campus; or at the outfall of Strawberry Creek to San Francisco Bay, the HRS surface water target. Total tritium was below the reporting limit (0.185 Bq/g [5 pCi/g]) in all samples for which it was analyzed.

Tritium was above the reporting limit of 7.4 Bq/Liter (L) (200 pCi/L) in most of the surface water samples collected from upper and lower Chicken Creek and in three monthly samples collected from the North Fork of Strawberry Creek between October 2001 and April 2002. Tritium was below the reporting limit at all other surface water sampling locations, including the two background locations; Strawberry Creek on the UC Berkeley campus; and the outfall of Strawberry Creek to San Francisco Bay, the HRS surface water target.

The variations in the concentrations of tritium reported in Chicken Creek and the North Fork of Strawberry Creek over time are shown on Figure 5-3. The figure includes the historical concentrations detected in the creeks as well as the results of the supplemental tritium sampling requested by the US/EPA. The current supplemental findings are consistent with historical sampling results, where tritium has been detected in Chicken Creek at concentrations from approximately 11 to 37 Bq/L (300 to 1,000 pCi/L), and occasionally in the North Fork of Strawberry Creek at lower concentrations. Concentrations of tritium reported during the supplemental sampling ranged from 8.6 to 20.1 Bq/L (233 to 544 pCi/L) in Chicken Creek and from 7.4 to 13.5 Bq/L (201 to 365 pCi/L) in North Fork Strawberry Creek. For comparison purposes the drinking water maximum contaminant level (MCL) for tritium is 740 Bq/L (20,000 pCi/L).

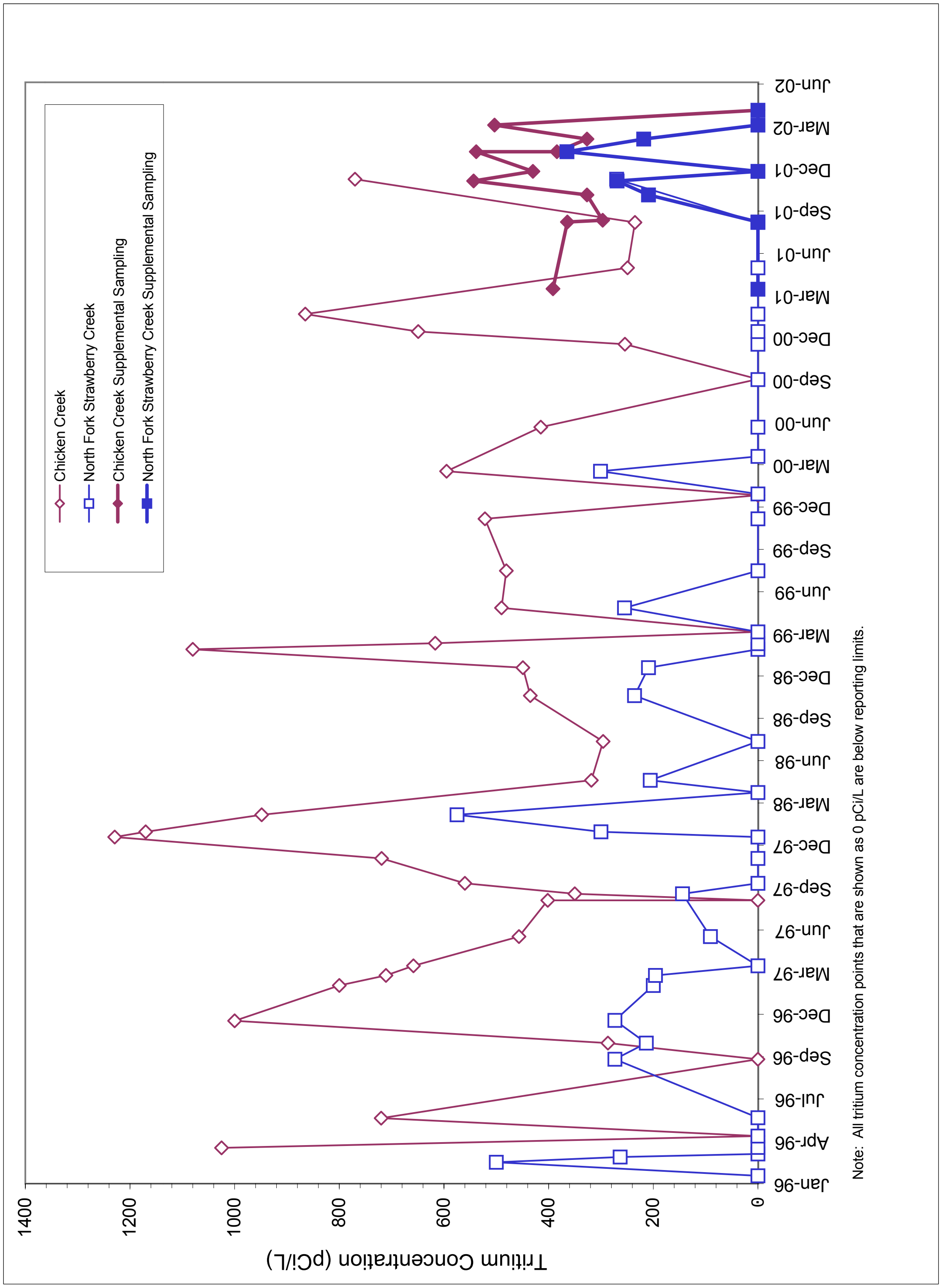

Figure 5-3 Concentrations of Tritium in Surface water samples from Chicken Creek and the North Fork of Strawberry Creek

Figure 5-4 shows the variation in tritium concentrations in Chicken and the North Fork of Strawberry Creeks for the supplemental tritium sampling and monthly rainfall amounts. As observed in the historical data, there was a good correlation between concentrations of tritium detected in the surface water samples collected from Chicken and the North Fork of Strawberry Creeks and monthly rainfall. Although concentrations are higher during the rainy season than during the dry season for the supplement sampling, the peaks in monthly rainfall generally do not coincide with the peaks in tritium concentrations in the surface water. This may be due to the decreased air emissions resulting from the closure of the NTLF in December 2001.

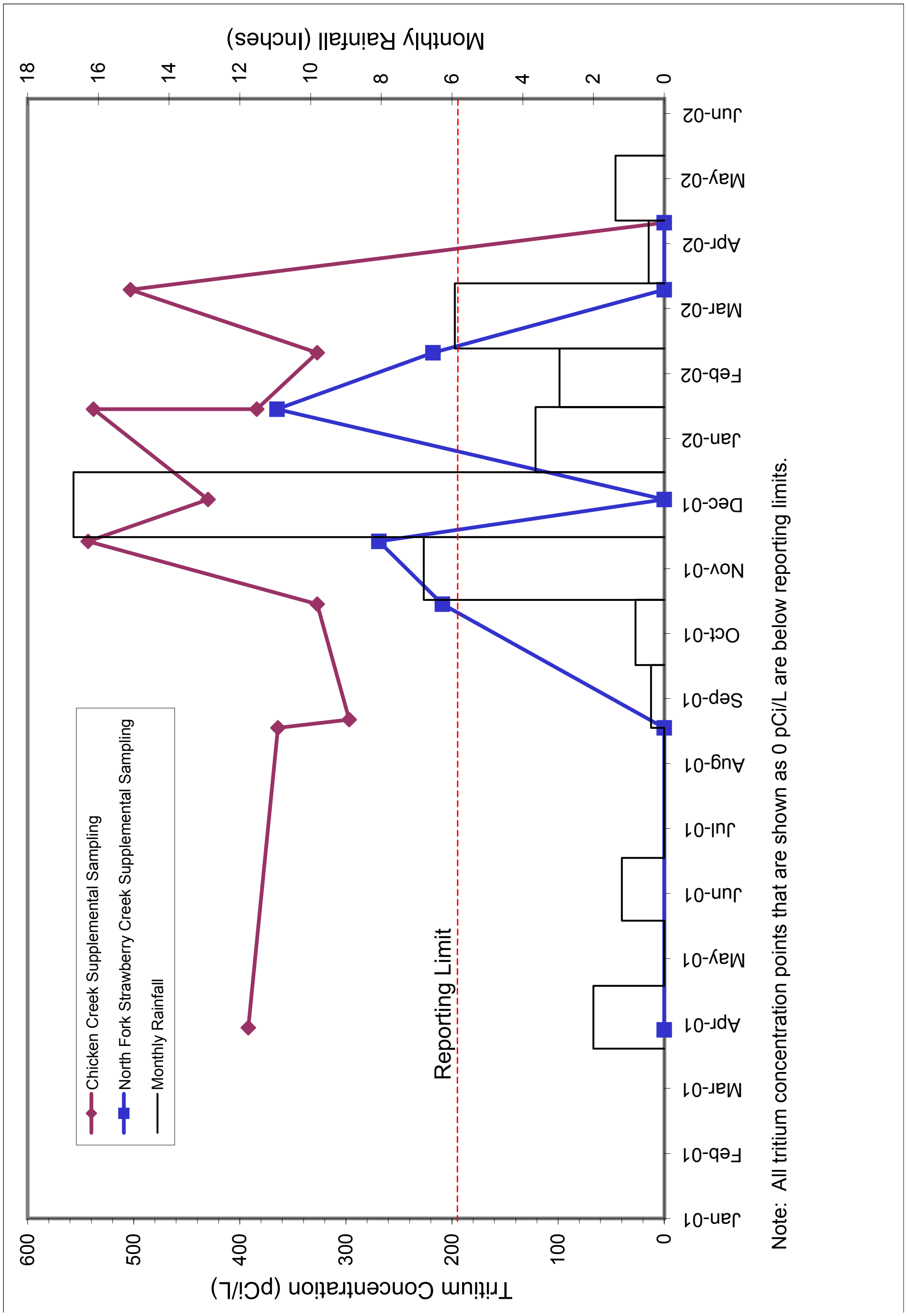

Figure 5-4 Concentrations of Tritium in Chicken Creek and the North Fork of Strawberry Creek Superimposed on Monthly Rainfall Amounts

5.4 QUALITY CONTROL RESULTS

As specified in the QAPP,[19] field duplicate surface water and sediment samples were to be collected for HTO analysis for approximately 20% (duplicate) and 10% (split) of the samples. In accordance with the QAPP, 24% of the primary surface water samples and 17% of the sediment samples were analyzed as duplicates and 13% of the primary surface water samples and 11% of the sediment samples were analyzed as splits. Seven of the nine split surface water samples and all four split sediment samples were analyzed as three-way splits by three separate laboratories (ES, NAREL, and RAML or Isotech).

As specified in the QAPP,[19] both duplicate and split samples were to be collected for approximately 30% of the sediment samples to be analyzed for total tritium. In accordance with the QAPP, 33% of the sediment samples were analyzed as duplicates and 33% as splits.

Relative percent differences (RPD) and relative error ratios (RERs) were calculated for replicate sample pairs (field duplicate and split samples) where both results were above the minimum detectable activity (MDA). RERs were not calculated for split samples analyzed by US/EPA's NAREL since the laboratory information required to compute the RER was not available. A graphical summary of RPD results is shown in Figure 5-5 for split and duplicate sediment and surface water samples. The acceptance criteria for replicate sediment and surface water samples are an RPD less than 50% or an RER less than 1.[19] As shown in Figure 5-5, none of the replicate samples exceeded the quality control acceptance criteria.

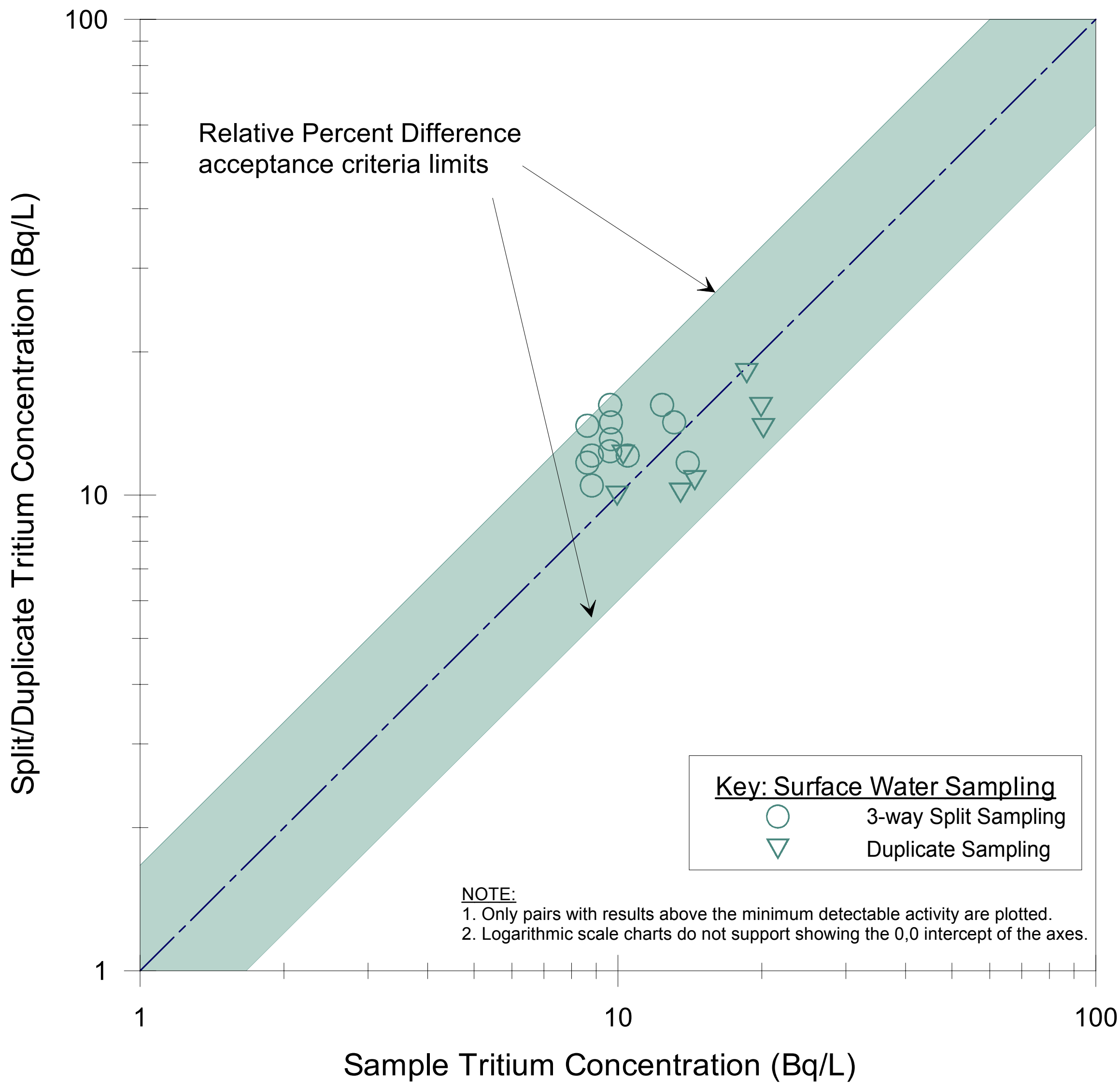

Figure 5-5 Comparison of Split and Duplicate Tritium Results for Surface Water Samples

6.0 VEGETATION MONITORING

In 2001, vegetation around the perimeter of the Berkeley Lab site was sampled with the following objectives, which are stated in the *Vegetation Sampling Plan for Tritium*: [24]

- To characterize tritium concentrations in trees near the Hillside Stack and the Lawrence Hall of Science
- To compare sample results with computer-modeled values to determine if there is a potential for adverse impact from vegetation as a result of Berkeley Lab tritium activities.

To meet these objectives, samples were collected at ten locations. Wood, leaf, duff (plant litter beneath the tree), and transpired-water samples were collected during the dry season (September 2001) and the wet season (November–December 2001). Members of the Environmental Sampling Task Force and representatives from the US/EPA and DOE were invited to observe the sampling. Samples were analyzed for tissue-free water tritium (TFWT) and organically bound tritium (OBT).

6.1 SAMPLE COLLECTION METHODS

Wood was collected by first measuring the minimum and maximum diameter of the tree trunk at approximately 1 m (3.3 ft) from the ground. From the diameter, the sampling team calculated the radius to determine the distance to the center of the tree. The team marked a new (for the dry-season sampling) or clean used (for the wet-season sampling) wood auger with tape to indicate the distance to the center of the tree. Using a heavy-duty, portable drill to power the marked wood auger and holding the wood auger perpendicular to the tree trunk, the team collected wood chips from the bark to the center of the tree. As the auger was reversed out of the tree, the wood chips fell into a plastic bag tacked to the tree and held open with gloved hands. Depending on the diameter of the tree, the team drilled three to six holes and collected 80-200 g (0.2-0.5 lb) of wood chips from each tree. The team wiped the auger after each tree was sampled and the wipes were analyzed by a laboratory for tritium (no tritium contamination was detected). The team labeled the sampled tree with a plastic identification plaque nailed to the trunk of the tree.

Leaves were collected at seven locations from the same tree sampled for wood and at three locations (NNW1, WNW4, and NNN5) from a tree within 5 m (16 ft), depending on the accessibility of branches. With gloved hands, the sampling team picked healthy-looking leaves from branches within reach of the ground. The team collected 60-340 g (0.1-0.7 lb) of leaves from each tree.

Duff was collected from beneath each tree sampled for wood. With gloved hands, the team sampled the duff layer at four locations evenly spaced around the base of the tree. The team collected 300-1,000 g (0.7-2 lb) of duff from beneath each sampled tree.

Each bag of wood, leaves, and duff was tightly sealed in the field. The team secured the top of the sample bag by twisting the top tightly, folding it over, and securing it with a rubber band. The team placed the bags in a cooler for transport back to Berkeley Lab. At Berkeley Lab, sealed sample bags were stored in a refrigerator until they were shipped. Within 24-72 hours, the team prepared the samples for shipment to the analytical laboratory by transferring each bagged sample into a fresh plastic bag, sealing the plastic bag as described above, placing the sealed plastic bag into a glass jar, and tightly fastening the lid on the jar.

Transpired water was collected at four locations from the same tree sampled for wood and at one location (NNW1) from a tree within 5 m (16 ft), depending on the accessibility of branches. Choosing a different branch than the one sampled for leaves, the sampling team sprayed the leaves with tap water and either allowed them to air dry or gently patted them dry with clean paper towels. The team then engulfed the branch with a large clear plastic bag. The team sealed the bag to the branch by tightly winding plastic tape around several inches of the top of the bag, cinching the top with a plastic ratchet-type tie, and finally winding and tying a rubber band around the top of the bag. The team checked the bags every few days to ensure their integrity and to monitor the rate of transpiration.

After 12 days of transpired water collection during the wet season, the team found that the bagged branch at one location (NNW3) had broken off, so they attached a new bag to an adjacent branch. After 14 days of wet-season collection, the team found that the bag at another location (SEE9) had torn and collected rainwater, so they discarded the old bag and attached a new bag to the branch. After a minimum of 30 ml (0.03 quarts) of transpired water were collected in each bag (requiring 7-51 days of collection), the team made a small slit in one corner of the bag and carefully poured the collected water into a glass jar with a screw-on lid. The team marked the sampled branch with a small strip of colored plastic tape wound around the branch.

Quality control samples of two different types were collected along with the vegetation samples. Duplicate samples were obtained at NNW1 during the dry and wet seasons when the sampling team collected a second sample of each medium in a separate bag or jar immediately after collecting the first sample. Split samples were collected at NNW2 during the dry and wet seasons when the sampling team filled a bag or jar with twice as much of each medium as needed (the samples were later split into separate containers and sent to different analytical laboratories). In a similar manner, the team collected additional split samples during the wet season at NNW1 and NNN5, which far exceeded the required number of split samples.

The team wore disposable gloves during sampling and sample preparation and changed gloves at each sampling location. With the exceptions noted above, all samples were collected as required by the approved *Vegetation Sampling Plan for Tritium*.[24]

6.2 SAMPLE LOCATIONS

Ten locations (Figure 6-1) were sampled: eight locations near the Berkeley Lab boundary and two remote background locations in Tilden and Chabot Regional Parks. Most of the locations are in the vicinity of the Lawrence Hall of Science, as requested by the Environmental Sampling Task Force.

The sampling team chose the trees at each location in accordance with the approved *Vegetation Sampling Plan for Tritium*, which identifies general areas where samples were to be collected. Within these general areas, the plan requires that the selected trees be off-site but as close as possible to the Berkeley Lab site boundaries. The plan also requires that tree selection be guided by the availability of appropriate vegetation; that is, mature trees able to withstand sampling and accessible terrain to safely collect the samples.

The sampling team was able to identify off-site trees for sampling at seven of the ten general areas cited in the plan. In three other areas (WNW4, SSE7, WWW8), appropriate vegetation was not available off-site for sampling. During a site visit in August 2001, representatives from the

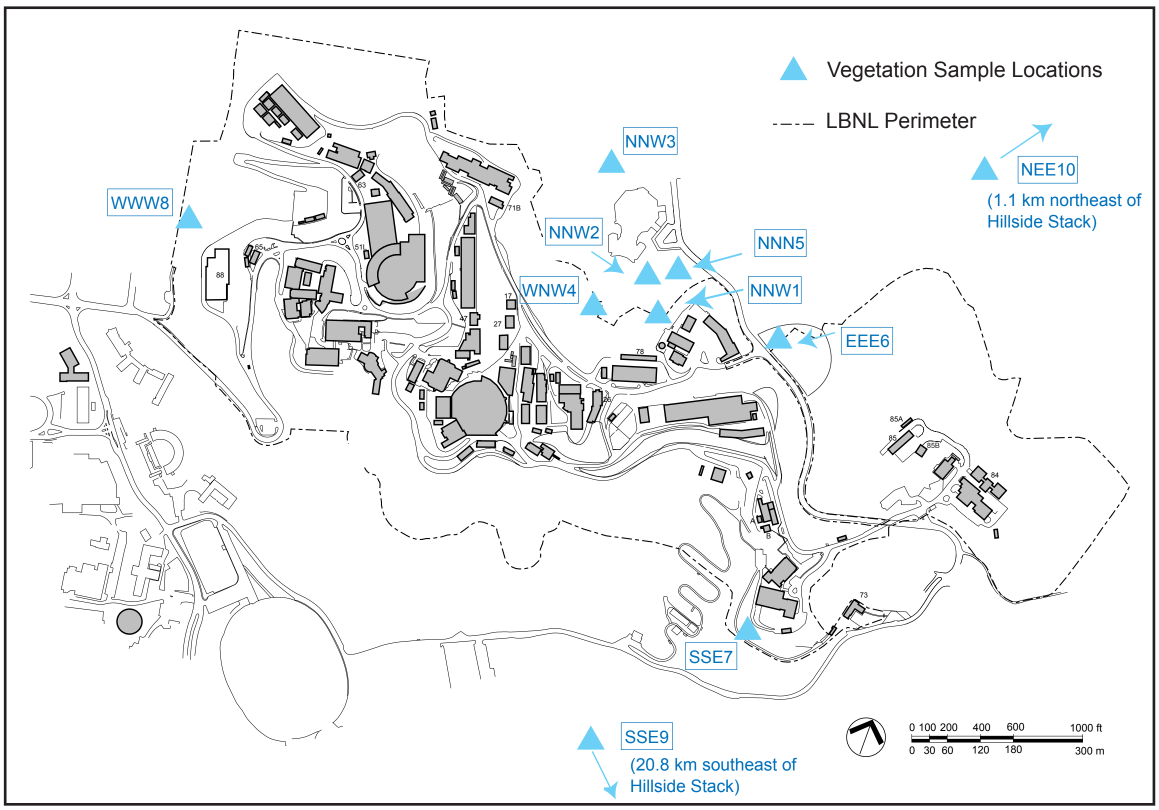

Figure 6-1 Vegetation Sample Locations

US/EPA and Berkeley Lab specifically reviewed these three locations. The sampling team proposed nearby, on-site trees for sampling, and it was agreed that these trees were acceptable, given the limitations of available, appropriate vegetation. Table 6-1 compares the sample locations proposed in the plan with the actual sample locations.

Additional information about the sample locations includes the following:

- The team sampled eucalyptus trees at all locations except one (WWW8), where only bay trees were accessible.
- The team recorded sample locations in latitude and longitude using a global positioning system or as distance and direction from the NTLF Hillside Stack using a tape measure and compass.
- The team sampled trees at background (farthest) locations first and sampled trees closest to the Hillside Stack last.

Table 6-1 Comparison of Proposed and Actual Vegetation Sample Locations

		Proposed Sample Location		Actual Sample Location	
Location	**Tree Diameter (cm)**	**Direction from NTLF Stack**	**Distance from NTLF Stack (m)**	**Direction from NTLF Stack**	**Distance from NTLF Stack (m)**
NNW1	48-52[a]	NNW	20	NNW	27.5[b]
NNW2	40-47	NNW	100	NNW	105 ± 12[c]
NNW3	55-68	NNW	300	NNW[d]	363 ± 7[c]
WNW4	39-44.5[a]	WNW	100	WSW	103 ± 10[c]
NNN5	46-49[a]	N	50	N[d]	45 ± 6[c]
EEE6	49-51	E	200	E[d]	215 ± 8[c]
SSE7	53-70	SSE	600	SSE[d]	529 ± 8[c]
WWW8	46-49	W	850	W[d]	832 ± 34[c]
SEE9	36-40	SE	20,000	SE[d]	20,800 ± 12[c,e]
NEE10	34-37	NE	1,000	NE[d]	1,080 ± 12[c,f]

[a] Diameter of tree sampled for wood and duff; leaves not accessible so nearby tree sampled for leaves and transpired water

[b] Based on tape measure reading

[c] Based on global positioning system reading

[d] Not in direct sight of NTLF stacks so direction is estimated

[e] 20,800 m = 20.8 km

[f] 1,080 m = 1.08 km

6.3 ANALYTICAL RESULTS

Eberline Services (ES), an analytical laboratory certified by the State of California Department of Health Services, analyzed most of the samples. The Center for Applied Isotope Studies (CAIS) at the University of Georgia analyzed split samples.

For all vegetation, ES chopped and blended (homogenized) each sample before taking a sub-sample for analysis. CAIS did not homogenize vegetation samples collected during the dry season before analysis but changed this procedure for the wet-season samples, which were homogenized before analysis.

The laboratories analyzed wood, leaf, and duff samples for TFWT and OBT and transpired-water samples for tritiated water. In the TFWT analyses, ES used azeotropic distillation and CAIS used vacuum extraction to remove tritiated water from samples. The resulting TFWT was analyzed using liquid scintillation counting. In the OBT analyses, both laboratories dried the sample in an oven, burned a dried sub-sample in an oxidizer (ES) or a Parr bomb (CAIS), collected the tritiated water that was produced, and analyzed the water for tritium using liquid scintillation counting. For transpired-water samples, both laboratories measured the tritium in the water sample directly using liquid scintillation counting.

The laboratories reported the results of each analysis in units of activity (in becquerels or curies) per weight (in grams) of wet vegetation or per volume (in liters) of transpired water. For each analysis, the laboratories also determined the minimum level of tritium that they could detect (the detection limit). In all cases, this detection limit was less than or equal to the level the laboratories were required by contract to achieve, which was 0.02 Bq/g (0.5 pCi/g) of TFWT, 0.2 Bq/g (5 pCi/g) of OBT, and 7 Bq/L (200 pCi/L) of tritium in transpired water.

Results are tabulated in Appendix A and shown on maps in Appendix C (note that results from samples collected at background locations, which were all less than the detection limit or very low, are not included on the maps). Results that are greater than the analytical laboratory's detection limit are reported as detected; results that are less than the detection limit are reported as not detected. This approach is a departure from previous methods of reporting vegetation results that used the contract reporting limits to determine whether tritium had been detected.

At distances of 363 m (1190 ft) and greater from the stack, the average TFWT measured in wood, leaves, and duff is less than the detection limits. In trees within 215 m (705 ft) of the stack, TFWT was detected in all media. The maximum TFWT in wood is 0.36 Bq/g (9.6 pCi/g), in leaves is 0.33 Bq/g (9.0 pCi/g), and in duff is 0.34 Bq/g (9.3 pCi/g). Three detected results are unexpected: in leaves at location WWW8, in duff at location SEE9, and in duff at location NEE10. In all cases, however, the results are very low (less than twice the detection limit) and so are probably spurious. As noted in an independent review of the data, "this apparent detection is not statistically significant because it is very close to the detection limit. This measurement should be considered a nondetect result."[5]

At distances of 363 m (1,190 ft) and greater from the stack, the average OBT measured in leaves and duff is less than the detection limits. In wood, OBT was detected in even fewer trees: only in trees at 27.5 m (90.2 ft) from the stack is the average OBT in wood more than the highest detection limit. The maximum OBT in wood is 0.20 Bq/g (5.4 pCi/g), in leaves is 1.5 Bq/g (41 pCi/g), and in duff is 8.9 Bq/g (240 pCi/g). Unexpectedly, OBT was detected in leaves at location SSE7; however, the results are very low (less than twice the detection limit) and so are probably spurious. Levels of OBT in leaves and duff were noted to be greater than corresponding levels of TFWT, which could be "an indication that the OBT measured in the leaves and duff is a result of tritium released over the past several years [from the Hillside Stack] as opposed to tritium currently being released."[5]

The results show that tritium levels in leaves, duff, and wood generally decrease with distance from the stack, as suggested by previous sampling.[24] The decrease in tritium levels as a function of distance from the stack is shown graphically in Figures 6-2 and 6-3. This conclusion is also supported by Thomas et al, who noted that "measurements taken beyond a few hundred meters from the Hillside Stack are at or below the limits of detection."[5] The same reviewers found that there are no major differences in tritium concentrations between wet and dry seasons, and that tritium concentrations in leaves, duff, and wood have generally decreased since 1998, when samples were collected in the same locations.[5]

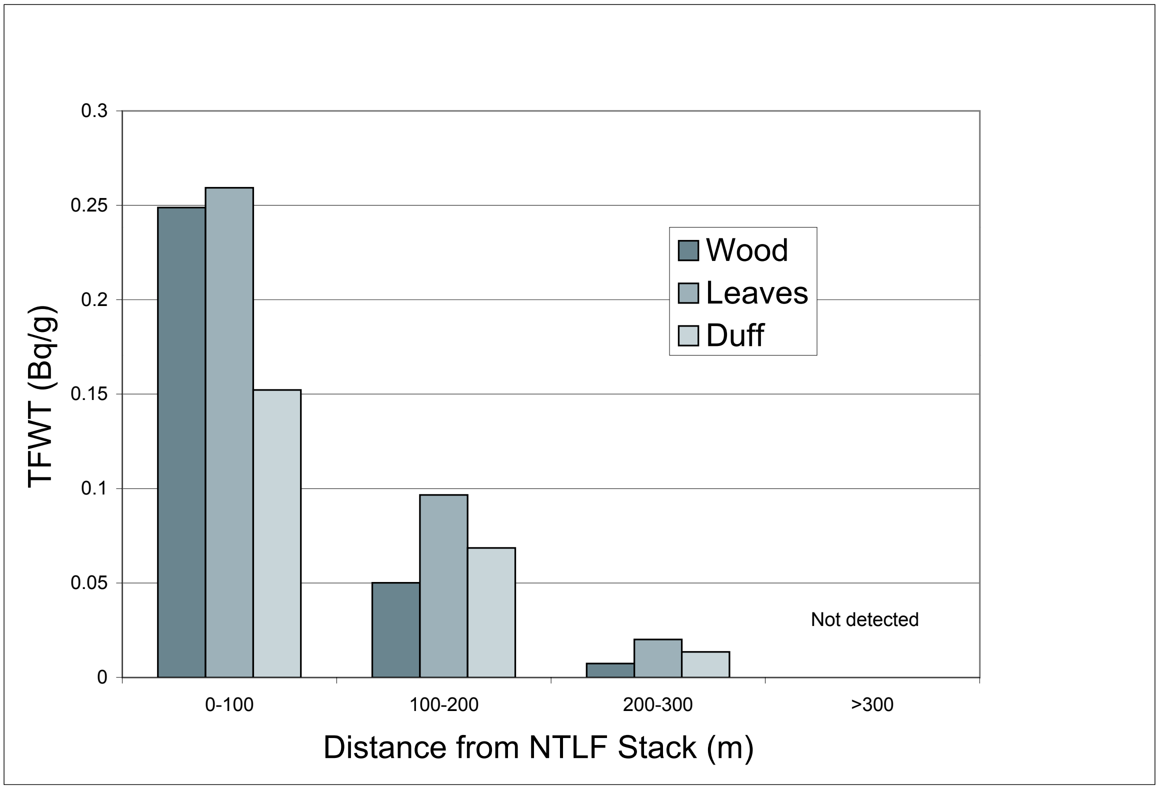

Figure 6-2 Average TFWT at Various Distances from NTLF Stack

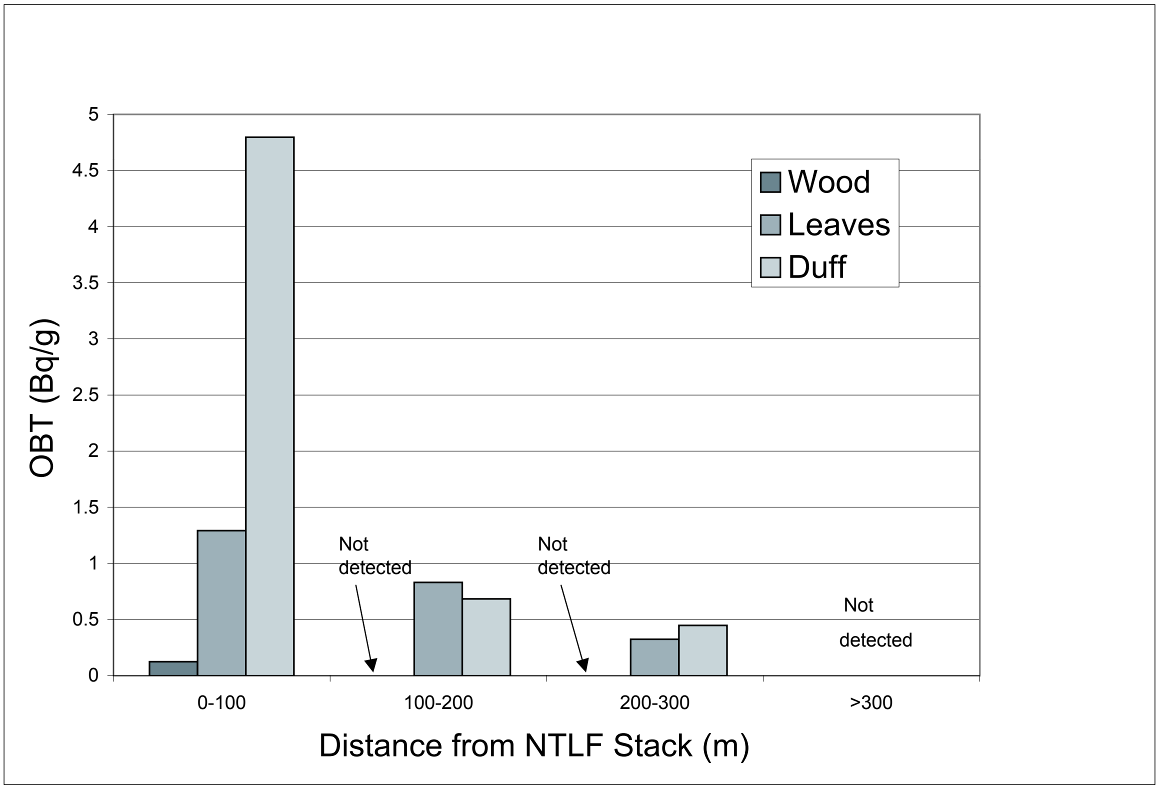

Figure 6-3 Average OBT at Various Distances from NTLF Stack

Transpired water was collected at three locations near the stack and at two distant background locations, Tilden and Chabot Regional Parks. No tritium was detected in transpired water collected at the background locations. In samples collected within 363 m (1190 ft) of the stack, the maximum tritium measured in transpired water is 504 Bq/L (13,600 pCi/L). As with other sampled media, tritium levels decrease with increasing distance from the stack (Figure 6-4).

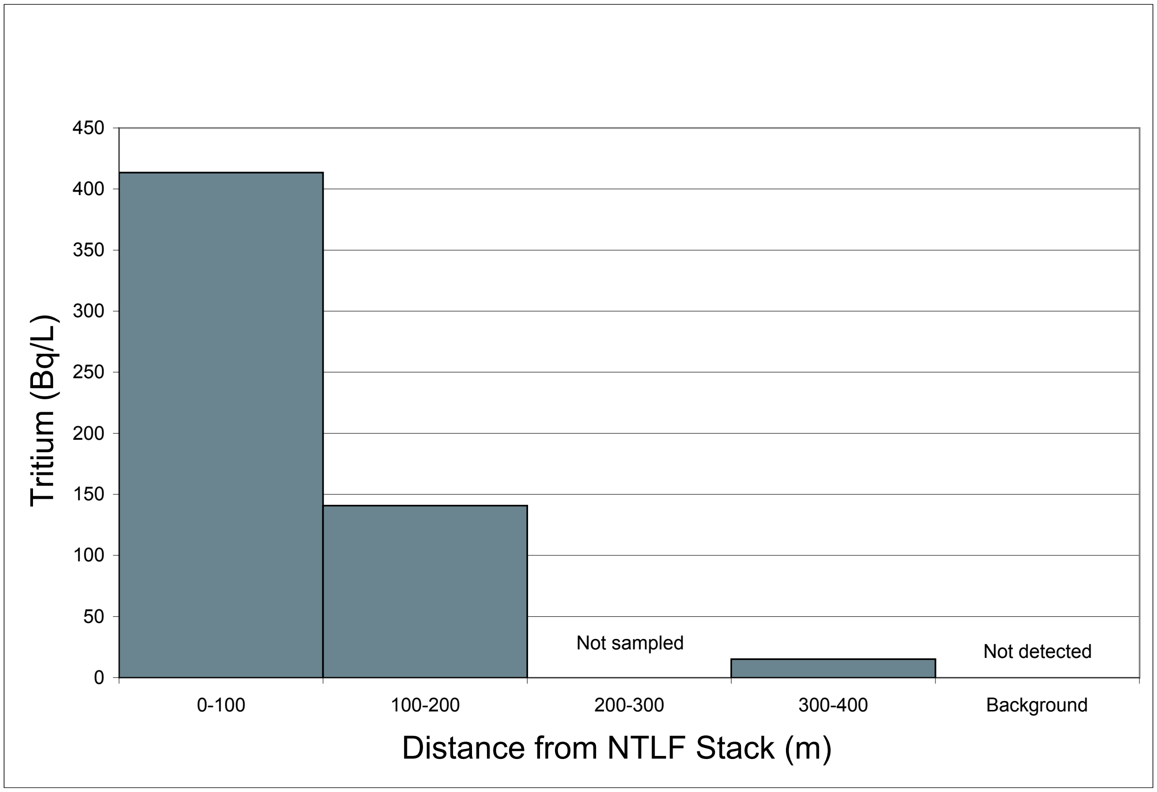

Figure 6-4 Average Tritium in Transpired Water

The preceding discussion indicates that the first objective of vegetation sampling, to characterize tritium in trees near the Hillside Stack and the Lawrence Hall of Science, was accomplished. The second objective, to determine if there is a potential for adverse impact from vegetation as a result of Berkeley Lab tritium activities, was accomplished in part by Thomas et al. in their review. This review determined that the individual and collective doses that could result from exposure to tritium in leaves, duff, and wood "are far below levels of concern for any exposure situation involving radionuclides in the environment."[5] Furthermore, the review noted that the potential risk from such doses is very low as well; so low, in fact, that the expected incidence of cancer over a lifetime in the exposed population is essentially zero. The view by Thomas et al. is discussed further in Section 7.5.

Thomas et al. also considered the risk from inhaling the water that is transpired by trees and that contains tritium at the levels measured in 2001.[5] They found that exposure to tritium in transpired water would result in doses and risks that are even less than those from exposure to tritium in leaves, duff, and wood.

6.4 QUALITY CONTROL RESULTS

Fourteen duplicate samples were analyzed by ES. Duplicates were analyzed blindly; that is, the analytical laboratory did not know which samples were duplicates. All duplicate results are

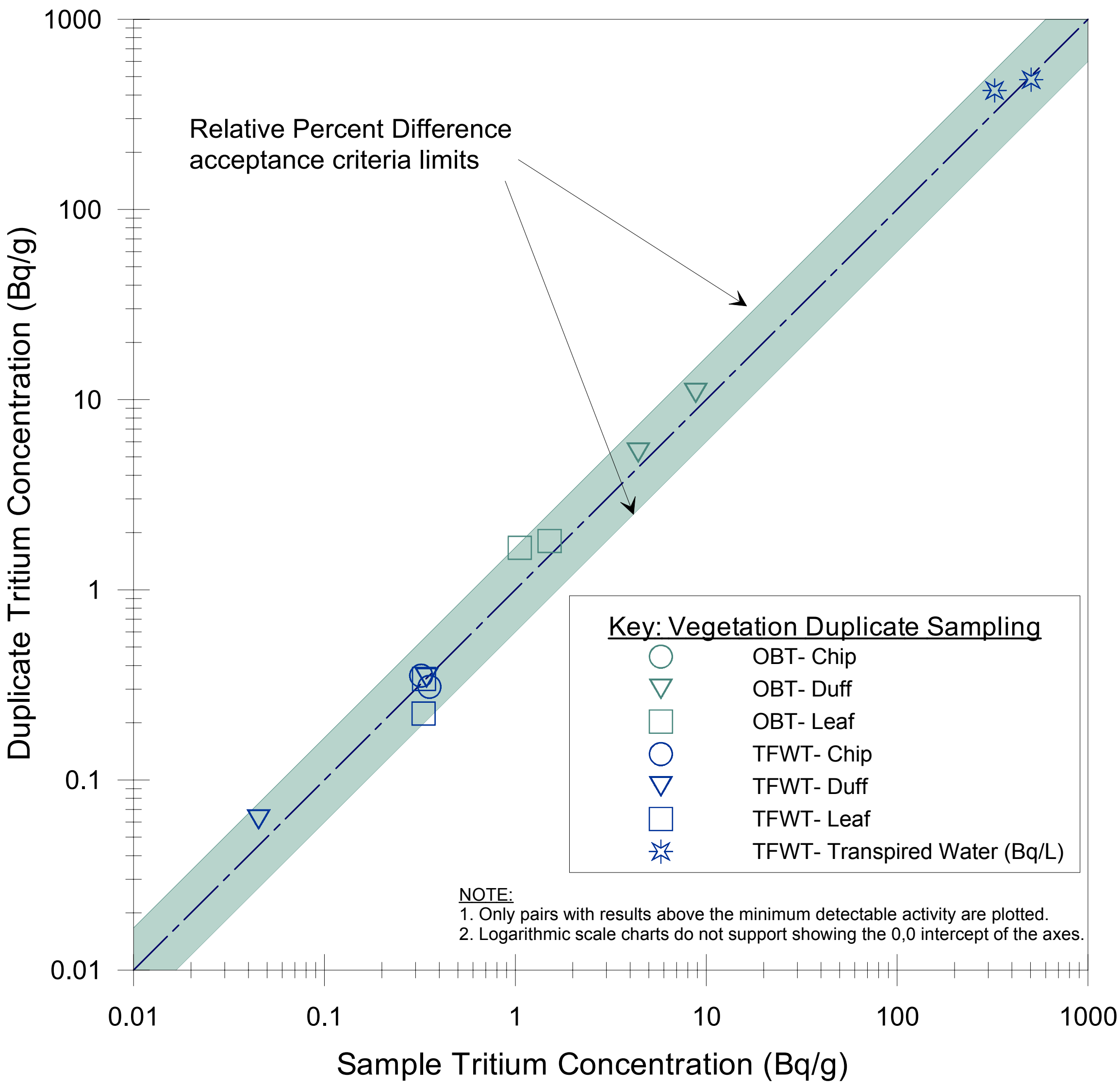

Figure 6-5 Comparison of Duplicate Tritium Results for Vegetation Samples

acceptable because, in comparison to the primary sample, they have a relative percent difference (RPD) less than 50% or relative error rate (RER) less than 1, as required by the QAPP.[19] The average RPD is 20% and the average RER is 0.76. Figure 6-5 is a plot of the sample result against its corresponding duplicate result. The solid line represents the ideal match.

Split samples were analyzed by the University of Georgia's CAIS, which was chosen by the US/EPA. Split samples, like duplicates, were analyzed blindly. Most (74%) of the split sample results meet the acceptance criteria of an RPD less than 50% or an RER less than 1, as required by the QAPP.[19] Quality control results for split analyses are shown in Figure 6-6.

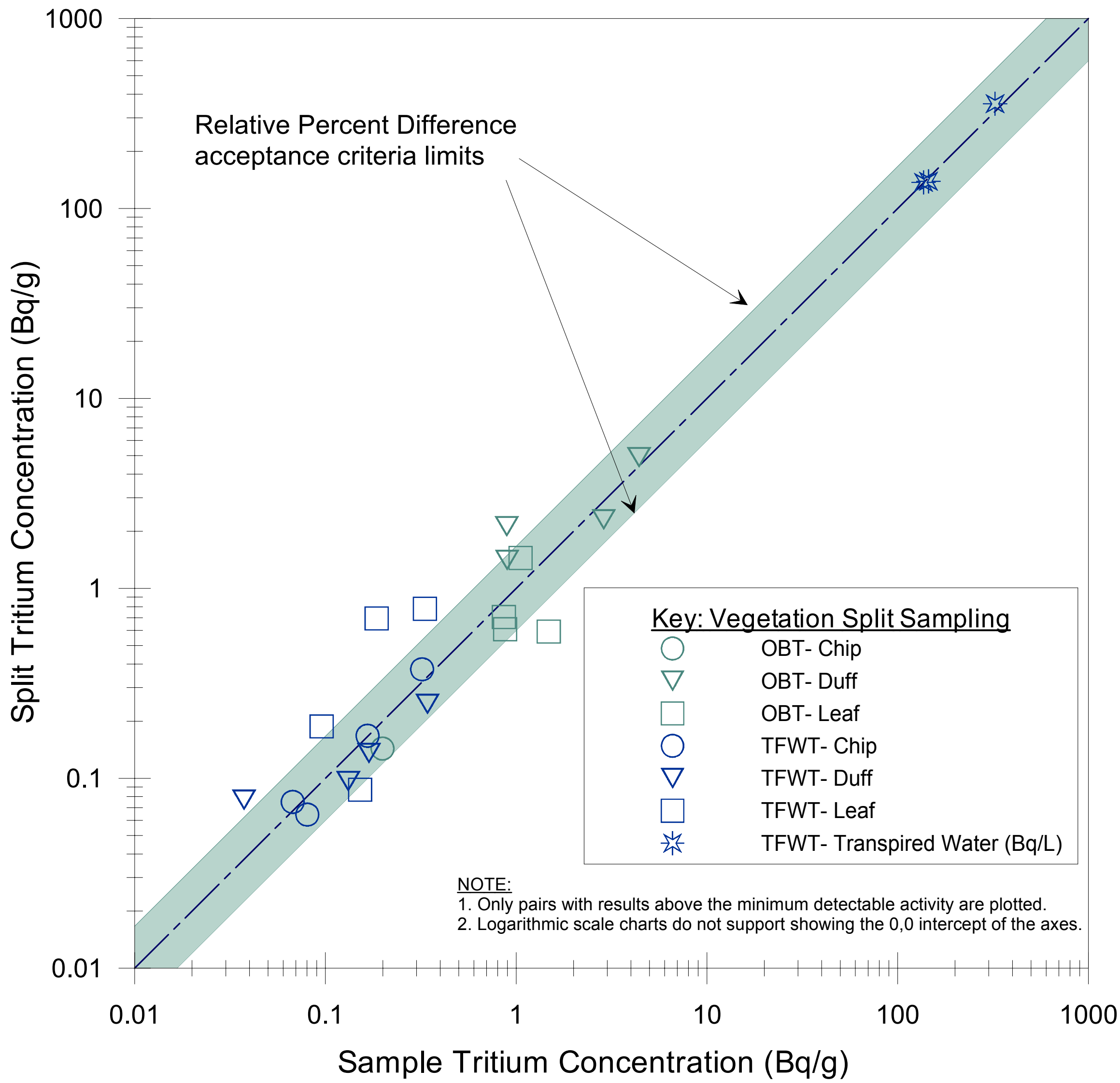

Figure 6-6 Comparison of Split Tritium Results for Vegetation Samples

The samples that fail these criteria are leaf and duff samples. The analyses that fail are primarily TFWT analyses. This suggests two possible sources of variation: heterogeneity of the samples and differences in analytical technique.

Heterogeneity is due to the fact that tritium is distributed within the matrix of the leaves and duff, and the leaves and duff are not chopped up and blended until they are received at the analytical laboratory. If the analytical laboratory doesn't blend the entire bag it receives but instead analyzes a subsample, more leaves or duff with lower tritium content may inadvertently be analyzed. This may have been the case with the dry-season samples analyzed by the University of Georgia's CAIS. This source of variation was anticipated in the QAPP[19], which states that variation in duplicate and split results "may be an indicator of matrix variability and inhomogeneity rather than an indication of poor laboratory performance."

Differences in analytical technique are another source of variation. Eberline Services uses azeotropic distillation to analyze TFWT in vegetation samples, while the CAIS uses vacuum extraction. Both techniques heat the sample but to different temperatures. While each technique provides generally accurate results, individual results could vary because of the different ways in which the sample is processed.

Although sample heterogeneity and analytical technique differences are sources of variation, these issues do not have a large effect on the split sample results, since nearly three-quarters of the results were within the acceptance criteria. With allowances for sample heterogeneity and differences in analytical techniques, the results of duplicate and split analyses indicate that the overall quality of the sample results is acceptable.

7.0 COMPARISON OF MEASURED TRITIUM LEVELS VS. TRITIUM LEVELS USED IN THE HEALTH RISK ASSESSMENT

One objective of the supplemental monitoring program was to measure and compare tritium data with data generated by a tritium fate and transport model used in the *Environmental Health-Risk Assessment for Tritium Releases at the National Tritium Labeling Facility at Lawrence Berkeley National Laboratory*[4] (McKone et al, 1997). The 1997 risk assessment considers three concentric zones in which people might be exposed to tritium released from Berkeley Lab. Zone 1 is defined as the area within a circle centered on the NTLF with a radius of 100 m and it is described as "the natural bowl that surrounds the NTLF and its ventilation stack." Zone 2 is defined as the area within a circular band having a minimum radius of 100 meters and a maximum radius of 1,100 meters from the NTLF. Zone 3 is defined as the area within a circular band having a minimum radius of 1,100 meters and a maximum radius of 2,100 meters from the NTLF.

McKone et al. uses a two-compartment model to estimate the distribution of tritium in the environment, assuming that 100 Ci/y of tritium is released from the NTLF. Approximately 16 curies of tritium were released from the NTLF during the supplemental monitoring program. Table 7-1 shows the maximum tritium (HTO or TWFT) results from the supplemental monitoring program compared to the modeled reasonable maximum tritium levels reported by McKone et al. in Table F-1.

Table 7-1. Comparison of Modeled and Measured Maximum Tritium Levels

Environmental Matrix Type	Zone 1 Tritium Level	Zone 2 Tritium Level	Zone 3 Tritium Level
Ambient Air (Bq/m3)			
Estimated by model[e]	96	5.2	0.35
Measured in 2001-2002[f]	3.3	2.2	0.88[g]
Soil/Sediment (Bq/kg)[a]			
Estimated by model[e]	175	9	N/A
Measured in 2001-2002[f]	370[b]	35	<7
Surface Water (Bq/L)[a]			
Estimated by model[e]	580	48	11
Measured in 2001-2002[f]	16	20	<7
Vegetation Free Water (Bq/kg)[c]			
Estimated by model[e]	1350	110	7
Measured in 2001-2002[d, f]	330	27	N/A

[a]Values are for tritiated water (HTO).

[b]Sample collected immediately adjacent to the Hillside Stack.

[c]Vegetation values are for tissue-free water tritium.

[d] Results from leaf samples.

[e]Reasonable maximum tritium concentration.

[f]Maximum measured concentration.

[g]Amito Reservoir is 2.2 km from the NTLF and slightly outside of the McKone et al. Zone 3.

7.1 SUPPLEMENTAL AMBIENT AIR DATA VS. COMPUTER MODELED VALUES

The maximum ambient air HTO results measured during the supplemental monitoring program for Zone 1 and 2 are well below the computer-modeled values generated for the risk assessment. The maximum ambient air HTO result for Zone 1 is 3.3 Bq/m^3 (90 pCi/m^3) at the Eucalyptus Grove location near the Hillside Stack and it is well below the modeled level of 96 Bq/m^3 (2,600 pCi/m^3). The maximum ambient air HTO result for Zone 2 is 2.2 Bq/m^3 (60 pCi/m^3) at the ENV-78 location and it is below the modeled level of 5.2 Bq/m^3 (140 pCi/m^3)

The maximum ambient air HTO result for Zone 3 is 0.88 Bq/m^3 at the Amito Reservoir location and it is higher than the modeled level of 0.35 Bq m^3. The Amito Reservoir sampling location is 2.2 km from the NTLF and slightly outside of the McKone et al Zone 3. The California Department of Health Services is investigating possible non-Berkeley Lab sources of tritium emissions near Amito Reservoir (See Section 3.4).

7.2 SUPPLEMENTAL SOIL/SEDIMENT DATA VS. COMPUTER-MODELED VALUES

The maximum measured soil or sediment tritium (HTO) results are higher than the computer-modeled reasonable maximum values used for the risk assessment. For Zone 1, the maximum soil HTO value measured is 370 Bq/kg (9,880 pCi/kg) and the model estimated 170 Bq/kg. For Zone 2, the maximum soil HTO value measured is 35 Bq/kg (940 pCi/kg) and the model estimated 9 Bq/kg (240 pCi/kg). Modeled data for comparison in Zone 3 was not provided by McKone et al. Although the maximum measured value for Zone 1 is higher than the modeled value, the soil containing that maximum level is limited to an area immediately adjacent to the Hillside Stack.

7.3 SUPPLEMENTAL SURFACE WATER DATA VS. COMPUTER-MODELED VALUES

McKone et al associated Chicken Creek with Zone 1, and so the maximum tritium (HTO) results for the Upper Chicken Creek location are shown in Zone 1 although the samples were actually collected in what would be considered Zone 2. Accordingly, for Zone 1, the maximum surface water HTO value measured is 16 Bq/L (430 pCi/L) at Upper Chicken Creek location and the model estimated 580 Bq/l (15,700 pCi/L). In Zone 2, the maximum surface water HTO value measured is 20 Bq/L (540 P/Ci/L) at the Lower Chicken Creek location and the model estimated 48 Bq/L (1,300 pCi/L). For Zone 3, the maximum surface water HTO value measured is <7 Bq/L (<190 pCi/L) and the model estimated 11 Bq/L (300 pCi/L).

7.4 SUPPLEMENTAL VEGETATION DATA VS. COMPUTER MODELED VALUE

Two vegetation sample locations (NNW1 and NNN5) are within Zone 1. Two additional locations (NNW2 and WNW4) are very close to the Zone 1 boundary and could be considered to be within Zone 1. Zone 2 includes all the remaining sample locations except one background location. The background location NEE10 is beyond even Zone 3 (Table 6-1).

The risk assessment Table F-1 does not include modeled levels of OBT in vegetation. Therefore for this report, the modeled levels are compared to leaf TFWT measured in 2001, which is the sampled medium that is most similar to edible vegetation. In 2001, the maximum Zone 1 TFWT measured in vegetation is 330 Bq/kg (9,000 pCi/kg). For Zone 1, the risk assessment model estimated the reasonable maximum level of TFWT in vegetation to be 1,350 Bq/kg (36,500 pCi/kg). In 2001, the maximum Zone 2 TFWT measured in leaves was 27 Bq/kg (730 pCi/kg). For Zone 2, the risk assessment model estimated the reasonable maximum level of TFWT in vegetation to be 110 Bq/kg (3,000 pCi/kg). In all zones, the modeled TFWT in vegetation is greater than the levels measured in leaves in 2001. There are no measured data from Zone 3 in 2001.

7.5 ANALYSIS OF POTENTIAL ADVERSE IMPACTS FROM TRITIUM IN VEGETATION

One objective of the TSAP[2] was to evaluate the potential for adverse impact on human health or the environment from vegetation as a result of Berkeley Lab tritium activities. To that end, an assessment was performed by SENES Oak Ridge Inc.[5] The assessment evaluated data collected in accordance with the vegetation sampling plan, compared that data with sample results collected in the past, and evaluated the potential for adverse impact on the environment or human health from the presence of tritium in vegetation as a result of Berkeley Lab operations.

The SENES assessment considered the following plausible scenarios that could result in human exposure to tritium in wood removed from Berkeley Lab:

- Processing of wood into paper products
- Processing of wood and leaves into mulch
- Use of wood in domestic fireplaces
- Disposal of wood in landfill

The maximum individual dose from tritium exposure was calculated to be about 0.08 mrem, which occurs in the scenario involving processing of wood and leaves into mulch. The maximum collective dose was calculated to be about 0.002 person-rem, which occurs in the scenario involving use of wood in domestic fireplaces. Based on these doses, the expected number of cancers in the exposed population from tritium released from LBNL is essentially zero.

Using conservative bounding calculations, SENES also estimated the amount of tritium being released from the hillside tree grove through transpiration and the resulting dose and risk for a maximally exposed individual at the Lawrence Hall of Science. The estimated maximum dose that an employee of the Lawrence Hall of Science for 30 years would receive from exposure to tritium being released from the hillside grove through transpiration would be less than 0.004 mrem. The lifetime risk from this dose would be less than 4×10^{-9} (or four additional cancers in 1 billion people), which is far too small to be observable.

The SENES assessment concluded that "the detectable quantities of tritium in vegetation surrounding LBNL are far below levels at which there would be reason for concern for adverse impacts to the environment or human health. Exposure to tritium contained in vegetation surrounding LBNL should result in lifetime doses to maximally exposed individuals of less than 1 mrem, considering plausible routes and mechanisms of human exposure."

8.0 CONCLUSIONS

The supplemental tritium monitoring requested by the US/EPA and concerned citizens was successfully completed by Berkeley Lab in May 2002. This monitoring was carried out over thirteen months, during which seasonal variations in environmental tritium levels were measured. Sampling activities were observed by government officials and interested members of the public. The monitoring achieved both objectives documented in the QAPP.[19]

The appropriate type and quality of data were collected for US/EPA to decide if Berkeley Lab should be placed on the NPL. Following the completion of the supplemental sampling, the US/EPA announced in July 2002 that the environmental sampling at the Berkeley Lab found tritium levels well below federal health standards, and it decided that no further action was required under the Superfund program. Furthermore, the US/EPA changed the site's Superfund status from "potentially eligible" for listing to "no further federal response."[3]

The results from the supplemental monitoring corroborate the large body of environmental tritium data that Berkeley Lab has previously collected and reported. Tritium levels in the environment are highest near the NTLF Hillside Stack, and even those levels are well below health hazard thresholds. As previously reported, the concentrations of tritium in the environment quickly decrease with distance. At a distance of 200-500 meters from the stack, the levels are at or near tritium detection limits for commercial analytical laboratories.

A comparison was made between the tritium concentrations measured under the supplemental monitoring program and the tritium concentrations predicted by the fate and transport model used in the *Environmental Health Risk Assessment for Tritium Releases at the National Tritium Labeling Facility at Lawrence Berkeley National Lab*.[4] The comparison determined that the tritium concentration data generated by the fate and transport model and used in the risk assessment are generally higher than levels measured during the supplemental monitoring period. For the environmental sample type (soil) where the level determined by the model is lower than the measured values, the associated exposure pathway is not a primary contributor to dose and risk.

In addition, an independent assessment by SENES Oak Ridge Inc. was performed on tritium-in-vegetation data collected for the supplemental monitoring program. The assessment determined that the levels of tritium in vegetation surrounding Berkeley Lab are far below levels for adverse impacts to the environment or human health. The assessment calculated that the maximum plausible human exposure to tritium contained in vegetation surrounding LBNL would result in a lifetime dose of less than 1 mrem and a cancer risk that is essentially zero.[5]

9.0 REFERENCES

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APPENDIX A: INDIVIDUAL ANALYTICAL RESULTS

Sampling Program	Analyte	Location	Date	Conventional Result	Conventional Units	SI Units Result	SI Units Units	QA/Sample Type
Ambient Air Monitoring	Tritiated Water	ENV-31	6/5/2001	< 2	pCi/m3	< 0.09	Bq/m3	Sample
			6/5/2001	< 2	pCi/m3	< 0.08	Bq/m3	Split
			7/3/2001	3.7	pCi/m3	0.14	Bq/m3	Sample
			7/3/2001	4.49	pCi/m3	0.166	Bq/m3	Split
			8/7/2001	< 3	pCi/m3	< 0.11	Bq/m3	Sample
			9/4/2001	8.6	pCi/m3	0.32	Bq/m3	Sample
			10/2/2001	< 3	pCi/m3	< 0.12	Bq/m3	Sample
			10/2/2001	< 3	pCi/m3	< 0.12	Bq/m3	Split
			11/6/2001	< 3	pCi/m3	< 0.1	Bq/m3	Sample
			12/4/2001	< 3	pCi/m3	< 0.12	Bq/m3	Sample
			12/4/2001	2.35	pCi/m3	0.0871	Bq/m3	Split
			1/8/2002	3.8	pCi/m3	0.14	Bq/m3	Sample
			1/8/2002	3.11	pCi/m3	0.115	Bq/m3	Split
			2/5/2002	< 3	pCi/m3	< 0.11	Bq/m3	Sample
			3/5/2002	4.2	pCi/m3	0.15	Bq/m3	Sample
			4/2/2002	< 4	pCi/m3	< 0.17	Bq/m3	Sample
			4/2/2002	< 2	pCi/m3	< 0.09	Bq/m3	Split
			5/7/2002	< 2	pCi/m3	< 0.08	Bq/m3	Sample
		ENV-44	6/5/2001	4.2	pCi/m3	0.16	Bq/m3	Sample
			6/5/2001	5.2	pCi/m3	0.19	Bq/m3	Split
			7/3/2001	13.7	pCi/m3	0.509	Bq/m3	Sample
			8/7/2001	< 3	pCi/m3	< 0.1	Bq/m3	Sample
			9/4/2001	5.7	pCi/m3	0.21	Bq/m3	Sample
			10/2/2001	8.7	pCi/m3	0.32	Bq/m3	Sample
			10/2/2001	11.3	pCi/m3	0.419	Bq/m3	Split
			11/6/2001	7.9	pCi/m3	0.29	Bq/m3	Sample
			11/6/2001	7.9	pCi/m3	0.29	Bq/m3	Split
			12/4/2001	3.8	pCi/m3	0.14	Bq/m3	Sample
			1/8/2002	7.65	pCi/m3	0.283	Bq/m3	Sample
			2/5/2002	13.4	pCi/m3	0.497	Bq/m3	Sample
			3/5/2002	11.1	pCi/m3	0.412	Bq/m3	Sample
			4/2/2002	4.2	pCi/m3	0.16	Bq/m3	Sample
			4/2/2002	5.5	pCi/m3	0.2	Bq/m3	Split
			5/7/2002	< 2	pCi/m3	< 0.07	Bq/m3	Sample
			5/7/2002	< 1.9	pCi/m3	< 0.07	Bq/m3	Split
		ENV-69	6/5/2001	10.7	pCi/m3	0.395	Bq/m3	Sample
			6/5/2001	13.7	pCi/m3	0.506	Bq/m3	Split
			7/3/2001	16.6	pCi/m3	0.614	Bq/m3	Sample
			7/3/2001	15.9	pCi/m3	0.588	Bq/m3	Split
			8/7/2001	18.4	pCi/m3	0.682	Bq/m3	Sample
			9/4/2001	14	pCi/m3	0.51	Bq/m3	Sample
			10/2/2001	23.8	pCi/m3	0.883	Bq/m3	Sample
			11/6/2001	7.9	pCi/m3	0.29	Bq/m3	Sample
			11/6/2001	6.7	pCi/m3	0.25	Bq/m3	Split

Sampling Program	Analyte	Location	Date	Conventional Result	Conventional Units	SI Units Result	SI Units Units	QA/Sample Type
Ambient Air Monitoring	Tritiated Water	ENV-69	12/4/2001	7.9	pCi/m^3	0.29	Bq/m^3	Sample
			1/8/2002	12.3	pCi/m^3	0.456	Bq/m^3	Sample
			2/5/2002	10	pCi/m^3	0.372	Bq/m^3	Sample
			3/5/2002	12.2	pCi/m^3	0.453	Bq/m^3	Sample
			4/2/2002	9.7	pCi/m^3	0.359	Bq/m^3	Sample
			5/7/2002	4.8	pCi/m^3	0.18	Bq/m^3	Sample
			5/7/2002	6.3	pCi/m^3	0.23	Bq/m^3	Split
		ENV-75EG	6/5/2001	34.9	pCi/m^3	1.29	Bq/m^3	Sample
			6/5/2001	40.9	pCi/m^3	1.51	Bq/m^3	Split
			7/3/2001	90.3	pCi/m^3	3.34	Bq/m^3	Sample
			7/3/2001	119	pCi/m^3	4.41	Bq/m^3	Split
			8/7/2001	41.4	pCi/m^3	1.53	Bq/m^3	Sample
			8/7/2001	57.3	pCi/m^3	2.12	Bq/m^3	Split
			9/4/2001	62	pCi/m^3	2.3	Bq/m^3	Sample
			9/4/2001	59	pCi/m^3	2.19	Bq/m^3	Split
			10/2/2001	76.9	pCi/m^3	2.85	Bq/m^3	Sample
			10/2/2001	77.8	pCi/m^3	2.88	Bq/m^3	Split
			11/6/2001	33.8	pCi/m^3	1.25	Bq/m^3	Sample
			11/6/2001	43.6	pCi/m^3	1.62	Bq/m^3	Split
			12/4/2001	31.6	pCi/m^3	1.17	Bq/m^3	Sample
			12/4/2001	36.7	pCi/m^3	1.36	Bq/m^3	Split
			1/8/2002	77.8	pCi/m^3	2.88	Bq/m^3	Sample
			1/8/2002	73.8	pCi/m^3	2.73	Bq/m^3	Split
			2/5/2002	36.1	pCi/m^3	1.34	Bq/m^3	Sample
			2/5/2002	33.7	pCi/m^3	1.25	Bq/m^3	Split
			3/5/2002	46.9	pCi/m^3	1.74	Bq/m^3	Sample
			3/5/2002	40.4	pCi/m^3	1.49	Bq/m^3	Split
			4/2/2002	23.7	pCi/m^3	0.876	Bq/m^3	Sample
			4/2/2002	20.9	pCi/m^3	0.773	Bq/m^3	Split
			5/7/2002	9.19	pCi/m^3	0.34	Bq/m^3	Sample
			5/7/2002	9.7	pCi/m^3	0.359	Bq/m^3	Split
		ENV-77	6/5/2001	18.3	pCi/m^3	0.679	Bq/m^3	Sample
			7/3/2001	52.7	pCi/m^3	1.95	Bq/m^3	Sample
			7/3/2001	45.1	pCi/m^3	1.67	Bq/m^3	Split
			8/7/2001	5.9	pCi/m^3	0.22	Bq/m^3	Sample
			9/4/2001	8.5	pCi/m^3	0.31	Bq/m^3	Sample
			10/2/2001	24.1	pCi/m^3	0.893	Bq/m^3	Sample
			11/6/2001	15	pCi/m^3	0.557	Bq/m^3	Sample
			11/6/2001	19.3	pCi/m^3	0.714	Bq/m^3	Split
			12/4/2001	9.57	pCi/m^3	0.354	Bq/m^3	Sample
			12/4/2001	9.32	pCi/m^3	0.345	Bq/m^3	Split
			1/8/2002	12.5	pCi/m^3	0.462	Bq/m^3	Sample
			1/8/2002	16.3	pCi/m^3	0.603	Bq/m^3	Split
			2/5/2002	23.4	pCi/m^3	0.866	Bq/m^3	Sample

Sampling Program	Analyte	Location	Date	Conventional Result	Units	SI Units Result	Units	QA/Sample Type
Ambient Air Monitoring	Tritiated Water	ENV-77	3/5/2002	18.3	pCi/m^3	0.676	Bq/m^3	Sample
			4/2/2002	9.1	pCi/m^3	0.337	Bq/m^3	Sample
			5/7/2002	3.3	pCi/m^3	0.12	Bq/m^3	Sample
			5/7/2002	4.5	pCi/m^3	0.17	Bq/m^3	Split
		ENV-78	6/5/2001	21.6	pCi/m^3	0.8	Bq/m^3	Sample
			7/3/2001	59.3	pCi/m^3	2.2	Bq/m^3	Sample
			7/3/2001	76.7	pCi/m^3	2.84	Bq/m^3	Split
			8/7/2001	11	pCi/m^3	0.42	Bq/m^3	Sample
			8/7/2001	13.5	pCi/m^3	0.499	Bq/m^3	Split
			9/4/2001	28.2	pCi/m^3	1.05	Bq/m^3	Sample
			10/2/2001	36	pCi/m^3	1.33	Bq/m^3	Sample
			11/6/2001	20.4	pCi/m^3	0.755	Bq/m^3	Sample
			12/4/2001	19.8	pCi/m^3	0.732	Bq/m^3	Sample
			12/4/2001	19.3	pCi/m^3	0.716	Bq/m^3	Split
			1/8/2002	21.8	pCi/m^3	0.809	Bq/m^3	Sample
			1/8/2002	23.5	pCi/m^3	0.872	Bq/m^3	Split
			2/5/2002	33.3	pCi/m^3	1.23	Bq/m^3	Sample
			3/5/2002	25.2	pCi/m^3	0.932	Bq/m^3	Sample
			4/2/2002	13.8	pCi/m^3	0.511	Bq/m^3	Sample
			5/7/2002	7.4	pCi/m^3	0.28	Bq/m^3	Sample
		ENV-85	6/5/2001	7.3	pCi/m^3	0.27	Bq/m^3	Sample
			7/3/2001	< 3	pCi/m^3	< 0.1	Bq/m^3	Sample
			8/7/2001	< 3	pCi/m^3	< 0.11	Bq/m^3	Sample
			8/7/2001	2.49	pCi/m^3	0.0921	Bq/m^3	Split
			9/4/2001	8.3	pCi/m^3	0.31	Bq/m^3	Sample
			10/2/2001	< 3	pCi/m^3	< 0.13	Bq/m^3	Sample
			11/6/2001	< 3	pCi/m^3	< 0.09	Bq/m^3	Sample
			12/4/2001	< 2	pCi/m^3	< 0.08	Bq/m^3	Sample
			12/4/2001	3.5	pCi/m^3	0.13	Bq/m^3	Split
			1/8/2002	< 1.5	pCi/m^3	< 0.06	Bq/m^3	Sample
			1/8/2002	< 1.6	pCi/m^3	< 0.06	Bq/m^3	Split
			2/5/2002	< 1.7	pCi/m^3	< 0.06	Bq/m^3	Sample
			2/5/2002	1.22	pCi/m^3	0.0453	Bq/m^3	Split
			3/5/2002	2.4	pCi/m^3	0.09	Bq/m^3	Sample
			4/2/2002	< 1.9	pCi/m^3	< 0.07	Bq/m^3	Sample
			5/7/2002	< 1.7	pCi/m^3	< 0.06	Bq/m^3	Sample
		ENV-AR	6/5/2001	5.3	pCi/m^3	0.2	Bq/m^3	Sample
			6/5/2001	6.41	pCi/m^3	0.237	Bq/m^3	Split
			7/3/2001	< 3	pCi/m^3	< 0.11	Bq/m^3	Sample
			7/3/2001	5.46	pCi/m^3	0.202	Bq/m^3	Split
			8/7/2001	< 3	pCi/m^3	< 0.1	Bq/m^3	Sample
			8/7/2001	2.36	pCi/m^3	0.0874	Bq/m^3	Split
			9/5/2001	6.7	pCi/m^3	0.25	Bq/m^3	Sample
			9/5/2001	2.43	pCi/m^3	0.0902	Bq/m^3	Split

Sampling Program	Analyte	Location	Date	Conventional Result	Units	SI Units Result	Units	QA/Sample Type
Ambient Air Monitoring	Tritiated Water	ENV-AR	10/2/2001	< 3	pCi/m^3	< 0.12	Bq/m^3	Sample
			10/2/2001	2.55	pCi/m^3	0.0945	Bq/m^3	Split
			11/6/2001	3.5	pCi/m^3	0.13	Bq/m^3	Sample
			11/6/2001	1.28	pCi/m^3	0.0474	Bq/m^3	Split
			12/4/2001	< 2	pCi/m^3	< 0.09	Bq/m^3	Sample
			12/4/2001	1.48	pCi/m^3	0.0548	Bq/m^3	Split
			1/8/2002	23.8	pCi/m^3	0.88	Bq/m^3	Sample
			1/8/2002	22.1	pCi/m^3	0.817	Bq/m^3	Split
			2/5/2002	< 1.6	pCi/m^3	< 0.06	Bq/m^3	Sample
			2/5/2002	1.58	pCi/m^3	0.0586	Bq/m^3	Split
			3/5/2002	15.5	pCi/m^3	0.573	Bq/m^3	Sample
			3/5/2002	26	pCi/m^3	0.964	Bq/m^3	Split
			4/2/2002	< 1.9	pCi/m^3	< 0.07	Bq/m^3	Sample
			4/2/2002	1.02	pCi/m^3	0.0377	Bq/m^3	Split
			5/7/2002	6.8	pCi/m^3	0.25	Bq/m^3	Sample
			5/7/2002	8.06	pCi/m^3	0.298	Bq/m^3	Split
		ENV-B13A	6/5/2001	6.4	pCi/m^3	0.24	Bq/m^3	Sample
			7/3/2001	< 3	pCi/m^3	< 0.1	Bq/m^3	Sample
			8/7/2001	< 3	pCi/m^3	< 0.1	Bq/m^3	Sample
			9/4/2001	< 4	pCi/m^3	< 0.13	Bq/m^3	Sample
			9/4/2001	< 3	pCi/m^3	< 0.11	Bq/m^3	Split
			10/2/2001	< 3	pCi/m^3	< 0.11	Bq/m^3	Sample
			10/2/2001	1.2	pCi/m^3	0.045	Bq/m^3	Split
			11/6/2001	3.3	pCi/m^3	0.12	Bq/m^3	Sample
			12/4/2001	< 2	pCi/m^3	< 0.09	Bq/m^3	Sample
			1/8/2002	< 2	pCi/m^3	< 0.08	Bq/m^3	Sample
			2/5/2002	3.1	pCi/m^3	0.12	Bq/m^3	Sample
			2/5/2002	3.3	pCi/m^3	0.12	Bq/m^3	Split
			3/5/2002	2.9	pCi/m^3	0.11	Bq/m^3	Sample
			3/5/2002	< 4	pCi/m^3	< 0.14	Bq/m^3	Split
			4/2/2002	< 3	pCi/m^3	< 0.11	Bq/m^3	Sample
			4/2/2002	1.18	pCi/m^3	0.0437	Bq/m^3	Split
			5/7/2002	< 1.6	pCi/m^3	< 0.06	Bq/m^3	Sample
		ENV-B13C	6/5/2001	8.6	pCi/m^3	0.32	Bq/m^3	Sample
			6/5/2001	8.4	pCi/m^3	0.311	Bq/m^3	Split
			7/3/2001	< 3	pCi/m^3	< 0.1	Bq/m^3	Sample
			8/7/2001	< 3	pCi/m^3	< 0.1	Bq/m^3	Sample
			9/4/2001	< 3	pCi/m^3	< 0.1	Bq/m^3	Sample
			9/4/2001	< 3	pCi/m^3	< 0.11	Bq/m^3	Split
			10/2/2001	< 3	pCi/m^3	< 0.1	Bq/m^3	Sample
			11/6/2001	< 2	pCi/m^3	< 0.08	Bq/m^3	Sample
			11/6/2001	0.99	pCi/m^3	0.037	Bq/m^3	Split
			12/4/2001	< 1.9	pCi/m^3	< 0.07	Bq/m^3	Sample
			1/8/2002	< 2	pCi/m^3	< 0.07	Bq/m^3	Sample

Sampling Program	Analyte	Location	Date	Conventional Result	Conventional Units	SI Units Result	SI Units Units	QA/Sample Type
Ambient Air Monitoring	Tritiated Water	ENV-B13C	2/5/2002	< 3	pCi/m3	< 0.12	Bq/m3	Sample
			3/5/2002	2.6	pCi/m3	0.096	Bq/m3	Sample
			3/5/2002	2.5	pCi/m3	0.091	Bq/m3	Split
			4/2/2002	< 2	pCi/m3	< 0.07	Bq/m3	Sample
			5/7/2002	< 1.7	pCi/m3	< 0.06	Bq/m3	Sample
			5/7/2002	0.71	pCi/m3	0.026	Bq/m3	Split
		ENV-B13D	6/5/2001	< 2	pCi/m3	< 0.09	Bq/m3	Sample
			7/3/2001	3.1	pCi/m3	0.11	Bq/m3	Sample
			8/7/2001	4.4	pCi/m3	0.16	Bq/m3	Sample
			9/4/2001	6.1	pCi/m3	0.22	Bq/m3	Sample
			9/4/2001	6.2	pCi/m3	0.23	Bq/m3	Split
			10/2/2001	5.9	pCi/m3	0.22	Bq/m3	Sample
			10/2/2001	6.3	pCi/m3	0.23	Bq/m3	Split
			11/6/2001	2.8	pCi/m3	0.1	Bq/m3	Sample
			12/4/2001	11.4	pCi/m3	0.421	Bq/m3	Sample
			1/8/2002	3.7	pCi/m3	0.14	Bq/m3	Sample
			2/5/2002	< 2	pCi/m3	< 0.08	Bq/m3	Sample
			3/5/2002	3.4	pCi/m3	0.12	Bq/m3	Sample
			3/5/2002	6.5	pCi/m3	0.24	Bq/m3	Split
			4/2/2002	< 1.9	pCi/m3	< 0.07	Bq/m3	Sample
			4/2/2002	< 1.8	pCi/m3	< 0.07	Bq/m3	Split
			5/7/2002	< 1.9	pCi/m3	< 0.07	Bq/m3	Sample
		ENV-LHS	6/5/2001	12.1	pCi/m3	0.449	Bq/m3	Sample
			6/5/2001	15.4	pCi/m3	0.572	Bq/m3	Split
			7/3/2001	25.7	pCi/m3	0.95	Bq/m3	Sample
			7/3/2001	34.8	pCi/m3	1.29	Bq/m3	Split
			8/7/2001	34.8	pCi/m3	1.29	Bq/m3	Sample
			8/7/2001	41.3	pCi/m3	1.53	Bq/m3	Split
			9/4/2001	25.3	pCi/m3	0.939	Bq/m3	Sample
			9/4/2001	26.7	pCi/m3	0.988	Bq/m3	Split
			10/2/2001	33.9	pCi/m3	1.26	Bq/m3	Sample
			10/2/2001	37.1	pCi/m3	1.38	Bq/m3	Split
			11/6/2001	14.1	pCi/m3	0.52	Bq/m3	Sample
			11/6/2001	13.9	pCi/m3	0.516	Bq/m3	Split
			12/4/2001	14.2	pCi/m3	0.526	Bq/m3	Sample
			12/4/2001	21.8	pCi/m3	0.808	Bq/m3	Split
			1/8/2002	35.2	pCi/m3	1.3	Bq/m3	Sample
			1/8/2002	33.4	pCi/m3	1.24	Bq/m3	Split
			2/5/2002	8.4	pCi/m3	0.311	Bq/m3	Sample
			2/5/2002	8.4	pCi/m3	0.311	Bq/m3	Split
			3/5/2002	11.1	pCi/m3	0.411	Bq/m3	Sample
			3/5/2002	10.8	pCi/m3	0.4	Bq/m3	Split
			4/2/2002	8.69	pCi/m3	0.322	Bq/m3	Sample
			4/2/2002	7.2	pCi/m3	0.267	Bq/m3	Split

Sampling Program	Analyte	Location	Date	Conventional Result	Units	SI Units Result	Units	QA/Sample Type
Ambient Air Monitoring	Tritiated Water	ENV-LHS	5/7/2002	5.3	pCi/m3	0.2	Bq/m3	Sample
			5/7/2002	8.18	pCi/m3	0.303	Bq/m3	Split
		ENV-MSRI	6/5/2001	16.3	pCi/m3	0.604	Bq/m3	Sample
			7/3/2001	12	pCi/m3	0.43	Bq/m3	Sample
			8/7/2001	14	pCi/m3	0.54	Bq/m3	Sample
			8/7/2001	13	pCi/m3	0.49	Bq/m3	Split
			9/4/2001	12	pCi/m3	0.43	Bq/m3	Sample
			10/2/2001	16.8	pCi/m3	0.623	Bq/m3	Sample
			11/6/2001	6.5	pCi/m3	0.24	Bq/m3	Sample
			12/4/2001	4.2	pCi/m3	0.16	Bq/m3	Sample
			1/8/2002	3.5	pCi/m3	0.13	Bq/m3	Sample
			2/5/2002	2.1	pCi/m3	0.078	Bq/m3	Sample
			2/5/2002	2.5	pCi/m3	0.092	Bq/m3	Split
			3/5/2002	22.6	pCi/m3	0.837	Bq/m3	Sample
			4/2/2002	3.8	pCi/m3	0.14	Bq/m3	Sample
			5/7/2002	3.5	pCi/m3	0.13	Bq/m3	Sample
		ENV-SSL	6/5/2001	18.5	pCi/m3	0.687	Bq/m3	Sample
			7/3/2001	8.2	pCi/m3	0.3	Bq/m3	Sample
			8/7/2001	9.8	pCi/m3	0.36	Bq/m3	Sample
			8/7/2001	13.7	pCi/m3	0.506	Bq/m3	Split
			9/4/2001	9	pCi/m3	0.33	Bq/m3	Sample
			9/4/2001	9.19	pCi/m3	0.34	Bq/m3	Split
			10/2/2001	9.1	pCi/m3	0.34	Bq/m3	Sample
			11/6/2001	4.3	pCi/m3	0.16	Bq/m3	Sample
			12/4/2001	4.2	pCi/m3	0.16	Bq/m3	Sample
			1/8/2002	2.1	pCi/m3	0.079	Bq/m3	Sample
			2/5/2002	2.3	pCi/m3	0.085	Bq/m3	Sample
			2/5/2002	2.5	pCi/m3	0.093	Bq/m3	Split
			3/5/2002	4.2	pCi/m3	0.16	Bq/m3	Sample
			3/5/2002	4.49	pCi/m3	0.166	Bq/m3	Split
			4/2/2002	3.4	pCi/m3	0.13	Bq/m3	Sample
			5/7/2002	4.5	pCi/m3	0.16	Bq/m3	Sample
		ENV-UCBG	6/5/2001	6.2	pCi/m3	0.23	Bq/m3	Sample
			6/5/2001	7.71	pCi/m3	0.286	Bq/m3	Split
			7/3/2001	< 3	pCi/m3	< 0.09	Bq/m3	Sample
			7/3/2001	4.37	pCi/m3	0.162	Bq/m3	Split
			8/7/2001	3.4	pCi/m3	0.13	Bq/m3	Sample
			8/7/2001	4.2	pCi/m3	0.155	Bq/m3	Split
			9/4/2001	< 3	pCi/m3	< 0.11	Bq/m3	Sample
			9/4/2001	2.63	pCi/m3	0.0976	Bq/m3	Split
			10/2/2001	4.9	pCi/m3	0.18	Bq/m3	Sample
			10/2/2001	5.22	pCi/m3	0.193	Bq/m3	Split
			11/7/2001	< 3	pCi/m3	< 0.12	Bq/m3	Sample
			11/7/2001	2.15	pCi/m3	0.0795	Bq/m3	Split

Sampling Program	Analyte	Location	Date	Conventional Result	Conventional Units	SI Units Result	SI Units Units	QA/Sample Type
Ambient Air Monitoring	Tritiated Water	ENV-UCBG	1/8/2002	< 3	pCi/m3	< 0.09	Bq/m3	Sample
			1/8/2002	2.44	pCi/m3	0.0905	Bq/m3	Split
			2/5/2002	4.5	pCi/m3	0.17	Bq/m3	Sample
			2/5/2002	3.11	pCi/m3	0.115	Bq/m3	Split
			3/5/2002	< 2	pCi/m3	< 0.08	Bq/m3	Sample
			3/5/2002	1.42	pCi/m3	0.0524	Bq/m3	Split
			4/2/2002	< 2	pCi/m3	< 0.07	Bq/m3	Sample
			4/2/2002	2.23	pCi/m3	0.0825	Bq/m3	Split
			5/7/2002	< 1.7	pCi/m3	< 0.06	Bq/m3	Sample
			5/7/2002	1.26	pCi/m3	0.0466	Bq/m3	Split
		TRAVEL BLANK	6/5/2001	< 6	pCi/S	< 0.2	Bq/S	Blank
			7/3/2001	4.44	pCi/S	0.164	Bq/S	Blank
			7/3/2001	< 6	pCi/S	< 0.2	Bq/S	Blank
			8/7/2001	< 6	pCi/S	< 0.2	Bq/S	Blank
			8/7/2001	< 1	pCi/S	< 0.04	Bq/S	Blank
			9/4/2001	3.68	pCi/S	0.136	Bq/S	Blank
			9/4/2001	7.4	pCi/S	0.27	Bq/S	Blank
			10/2/2001	< 7	pCi/S	< 0.2	Bq/S	Blank
			11/7/2001	< 7	pCi/S	< 0.3	Bq/S	Blank
			12/4/2001	< 7	pCi/S	< 0.2	Bq/S	Blank
			1/8/2002	3.1	pCi/S	0.12	Bq/S	Blank
			1/8/2002	2.01	pCi/S	0.0744	Bq/S	Blank
			1/8/2002	< 5	pCi/S	< 0.2	Bq/S	Blank
			2/5/2002	6	pCi/S	0.22	Bq/S	Blank
			2/5/2002	< 11	pCi/S	< 0.4	Bq/S	Blank
			3/5/2002	< 9	pCi/S	< 0.3	Bq/S	Blank
			4/2/2002	< 5	pCi/S	< 0.17	Bq/S	Blank
			4/2/2002	< 30	pCi/S	< 1.1	Bq/S	Blank
			5/7/2002	1	pCi/S	0.037	Bq/S	Blank
			5/7/2002	< 1	pCi/S	< 0.04	Bq/S	Blank
			5/7/2002	< 4	pCi/S	< 0.15	Bq/S	Blank
			5/7/2002	< 1.6	pCi/S	< 0.06	Bq/S	Blank
Sediment Monitoring	Total Tritium	Chicken Creek (Lower)	4/10/2001	< 5	pCi/g	< 0.19	Bq/g	Duplicate
			4/10/2001	< 5	pCi/g	< 0.19	Bq/g	Sample
			9/4/2001	< 5	pCi/g	< 0.19	Bq/g	Duplicate
			9/4/2001	< 5	pCi/g	< 0.19	Bq/g	Sample
		Chicken Creek (Upper)	4/9/2001	< 5	pCi/g	< 0.19	Bq/g	Sample
			4/9/2001	< 5	pCi/g	< 0.19	Bq/g	Split
			4/9/2001	< 5	pCi/g	< 0.19	Bq/g	Split
			8/31/2001	< 5	pCi/g	< 0.19	Bq/g	Sample
			8/31/2001	< 5	pCi/g	< 0.19	Bq/g	Split
		N. Fork Strawberry (Upper)	4/10/2001	< 5	pCi/g	< 0.19	Bq/g	Sample
			8/31/2001	< 5	pCi/g	< 0.19	Bq/g	Sample
	Tritiated Water	Banana Creek	4/10/2001	< 0.2	pCi/g	< 0.007	Bq/g	Duplicate

Sampling Program	Analyte	Location	Date	Conventional Result	Conventional Units	SI Units Result	SI Units Units	QA/Sample Type
Sediment Monitoring	Tritiated Water	Banana Creek	4/10/2001	0.2	pCi/g	0.007	Bq/g	Sample
			8/31/2001	< 0.2	pCi/g	< 0.007	Bq/g	Duplicate
			8/31/2001	< 0.2	pCi/g	< 0.007	Bq/g	Sample
		Cafeteria Creek (Lower)	4/10/2001	< 0.2	pCi/g	< 0.007	Bq/g	Sample
			9/4/2001	< 0.2	pCi/g	< 0.007	Bq/g	Sample
		Cafeteria Creek (Upper)	4/10/2001	< 0.2	pCi/g	< 0.007	Bq/g	Sample
			9/4/2001	< 0.2	pCi/g	< 0.007	Bq/g	Sample
		Chicken Creek (Lower)	4/10/2001	< 0.2	pCi/g	< 0.007	Bq/g	Duplicate
			4/10/2001	< 0.2	pCi/g	< 0.007	Bq/g	Sample
			9/4/2001	< 0.2	pCi/g	< 0.007	Bq/g	Duplicate
			9/4/2001	< 0.2	pCi/g	< 0.007	Bq/g	Sample
		Chicken Creek (Upper)	4/9/2001	< 0.2	pCi/g	< 0.007	Bq/g	Sample
			4/9/2001	< 0.2	pCi/g	< 0.007	Bq/g	Split
			4/9/2001	< 0.2	pCi/g	< 0.007	Bq/g	Split
			8/31/2001	< 0.2	pCi/g	< 0.007	Bq/g	Sample
			8/31/2001	< 0.2	pCi/g	< 0.007	Bq/g	Split
			8/31/2001	< 0.2	pCi/g	< 0.007	Bq/g	Split
		Lake Anza	4/9/2001	< 0.2	pCi/g	< 0.007	Bq/g	Sample
			9/4/2001	< 0.2	pCi/g	< 0.007	Bq/g	Sample
		Lake Temescal	4/9/2001	< 0.2	pCi/g	< 0.007	Bq/g	Sample
			9/5/2001	< 0.2	pCi/g	< 0.007	Bq/g	Sample
		N. Fork Strawberry (Lower)	4/10/2001	< 0.2	pCi/g	< 0.007	Bq/g	Duplicate
			4/10/2001	< 0.2	pCi/g	< 0.007	Bq/g	Sample
			8/31/2001	< 0.2	pCi/g	< 0.007	Bq/g	Duplicate
			8/31/2001	< 0.2	pCi/g	< 0.007	Bq/g	Sample
		N. Fork Strawberry (Upper)	4/10/2001	< 0.2	pCi/g	< 0.007	Bq/g	Sample
			8/31/2001	< 0.2	pCi/g	< 0.007	Bq/g	Sample
		No Name Creek (Lower)	4/10/2001	< 0.2	pCi/g	< 0.007	Bq/g	Sample
			9/4/2001	< 0.2	pCi/g	< 0.007	Bq/g	Sample
		No Name Creek (Upper)	4/10/2001	< 0.2	pCi/g	< 0.007	Bq/g	Sample
			9/4/2001	< 0.2	pCi/g	< 0.007	Bq/g	Sample
		Pineapple Creek	4/10/2001	< 0.2	pCi/g	< 0.007	Bq/g	Sample
			8/31/2001	< 0.2	pCi/g	< 0.007	Bq/g	Sample
		Ravine Creek (Lower)	4/9/2001	< 0.2	pCi/g	< 0.007	Bq/g	Sample
			4/9/2001	< 0.2	pCi/g	< 0.007	Bq/g	Split
			4/9/2001	< 0.2	pCi/g	< 0.007	Bq/g	Split
			8/31/2001	< 0.2	pCi/g	< 0.007	Bq/g	Sample
			8/31/2001	< 0.2	pCi/g	< 0.007	Bq/g	Split
			8/31/2001	< 0.2	pCi/g	< 0.007	Bq/g	Split
		Ravine Creek (Upper)	4/9/2001	< 0.2	pCi/g	< 0.007	Bq/g	Sample
			8/31/2001	< 0.2	pCi/g	< 0.007	Bq/g	Sample
		Strawberry Creek Outfall	4/10/2001	< 0.2	pCi/g	< 0.007	Bq/g	Sample
			9/4/2001	< 0.2	pCi/g	< 0.007	Bq/g	Sample
		Strawberry Creek UC	4/10/2001	< 0.2	pCi/g	< 0.007	Bq/g	Sample

Sampling Program	Analyte	Location	Date	Conventional Result	Units	SI Units Result	Units	QA/Sample Type
Sediment Monitoring	Tritiated Water	Strawberry Creek UC	9/4/2001	< 0.2	pCi/g	< 0.007	Bq/g	Sample
		Ten Inch Creek (Lower)	4/11/2001	< 0.2	pCi/g	< 0.007	Bq/g	Sample
			9/4/2001	< 0.2	pCi/g	< 0.007	Bq/g	Sample
		Ten Inch Creek (Upper)	4/11/2001	< 0.2	pCi/g	< 0.007	Bq/g	Sample
			9/4/2001	< 0.2	pCi/g	< 0.007	Bq/g	Sample
Soil Monitoring	Total Tritium	SSNTLF-01-11-0.5	4/4/2001	< 5	pCi/g	< 0.19	Bq/g	Single Point
		SSNTLF-01-11-1.5	4/4/2001	< 5	pCi/g	< 0.19	Bq/g	Single Point
		SSNTLF-01-11Comp-0.5	4/4/2001	< 5	pCi/g	< 0.19	Bq/g	Composite
		SSNTLF-01-11Comp-1.5	4/4/2001	< 5	pCi/g	< 0.19	Bq/g	Composite
		SSNTLF-01-14-0.5	4/24/2001	< 5	pCi/g	< 0.19	Bq/g	Single Point
		SSNTLF-01-14-1.5	4/24/2001	< 5	pCi/g	< 0.19	Bq/g	Single Point
		SSNTLF-01-14D-0.5	4/24/2001	< 5	pCi/g	< 0.19	Bq/g	Duplicate
		SSNTLF-01-14D-1.5	4/24/2001	< 5	pCi/g	< 0.19	Bq/g	Duplicate
		SSNTLF-01-43-0.5	4/18/2001	41.4	pCi/g	1.53	Bq/g	Single Point
		SSNTLF-01-43-1.5	4/18/2001	41.2	pCi/g	1.53	Bq/g	Single Point
		SSNTLF-01-47-0.5A	4/2/2001	< 5	pCi/g	< 0.19	Bq/g	Single Point
		SSNTLF-01-47-0.5B	4/2/2001	< 5	pCi/g	< 0.19	Bq/g	Split
		SSNTLF-01-47-1.5A	4/2/2001	< 5	pCi/g	< 0.19	Bq/g	Single Point
		SSNTLF-01-47-1.5B	4/2/2001	< 5	pCi/g	< 0.19	Bq/g	Split
		SSNTLF-01-47Comp-0.5A	4/2/2001	< 5	pCi/g	< 0.19	Bq/g	Composite
		SSNTLF-01-47Comp-0.5B	4/2/2001	< 5	pCi/g	< 0.2	Bq/g	Split
		SSNTLF-01-47Comp-0.5C	4/2/2001	< 5	pCi/g	< 0.19	Bq/g	Split
		SSNTLF-01-47Comp-1.5A	4/2/2001	< 5	pCi/g	< 0.19	Bq/g	Composite
		SSNTLF-01-47Comp-1.5B	4/2/2001	< 5	pCi/g	< 0.2	Bq/g	Split
		SSNTLF-01-47Comp-1.5C	4/2/2001	< 5	pCi/g	< 0.19	Bq/g	Split
		SSNTLF-01-64-0.5	4/6/2001	< 5	pCi/g	< 0.19	Bq/g	Single Point
		SSNTLF-01-64-1.5	4/19/2001	< 5	pCi/g	< 0.19	Bq/g	Single Point
	Tritiated Water	SSNTLF-01-1-0.5	4/4/2001	0.289	pCi/g	0.0107	Bq/g	Single Point
		SSNTLF-01-1-1.5	4/4/2001	0.356	pCi/g	0.0132	Bq/g	Single Point
		SSNTLF-01-10-0.5	4/12/2001	0.237	pCi/g	0.00878	Bq/g	Single Point
		SSNTLF-01-10-1.5	4/12/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-11-0.5	4/4/2001	0.389	pCi/g	0.0144	Bq/g	Single Point
		SSNTLF-01-11-1.5	4/4/2001	0.298	pCi/g	0.011	Bq/g	Single Point
		SSNTLF-01-11Comp-0.5	4/4/2001	0.542	pCi/g	0.0201	Bq/g	Composite
		SSNTLF-01-11Comp-1.5	4/4/2001	0.378	pCi/g	0.014	Bq/g	Composite
		SSNTLF-01-12-0.5A	4/13/2001	0.881	pCi/g	0.0326	Bq/g	Single Point
		SSNTLF-01-12-0.5B	4/13/2001	0.68	pCi/g	0.0252	Bq/g	Split
		SSNTLF-01-12-1.5A	4/13/2001	0.746	pCi/g	0.0276	Bq/g	Single Point
		SSNTLF-01-12-1.5B	4/13/2001	0.39	pCi/g	0.0144	Bq/g	Split
		SSNTLF-01-12Comp-0.5A	4/13/2001	0.957	pCi/g	0.0354	Bq/g	Composite
		SSNTLF-01-12Comp-0.5B	4/13/2001	0.44	pCi/g	0.0163	Bq/g	Split
		SSNTLF-01-12Comp-0.5C	4/13/2001	0.72	pCi/g	0.0267	Bq/g	Split
		SSNTLF-01-12Comp-1.5A	4/13/2001	0.836	pCi/g	0.031	Bq/g	Composite
		SSNTLF-01-12Comp-1.5B	4/13/2001	0.62	pCi/g	0.023	Bq/g	Split

Sampling Program	Analyte	Location	Date	Conventional Result	Units	SI Units Result	Units	QA/Sample Type
Soil Monitoring	Tritiated Water	SSNTLF-01-12Comp-1.5C	4/13/2001	0.67	pCi/g	0.0248	Bq/g	Split
		SSNTLF-01-13-0.5	4/18/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-13-1.5	4/18/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-14-0.5	4/24/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-14-1.5	4/24/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-14D-0.5	4/24/2001	< 0.2	pCi/g	< 0.007	Bq/g	Duplicate
		SSNTLF-01-14D-1.5	4/24/2001	< 0.2	pCi/g	< 0.007	Bq/g	Duplicate
		SSNTLF-01-15-0.5	5/3/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-15-1.5	5/3/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-16-0.5	5/1/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-16-1.5	5/1/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-16D-0.5	5/1/2001	< 0.2	pCi/g	< 0.007	Bq/g	Duplicate
		SSNTLF-01-16D-1.5	5/1/2001	< 0.2	pCi/g	< 0.007	Bq/g	Duplicate
		SSNTLF-01-17-0.5	4/23/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-17-1.5	4/23/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-18-0.5	4/23/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-18-1.5	4/23/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-19-0.5	4/23/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-19-1.5	4/23/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-1Comp-0.5	4/4/2001	0.542	pCi/g	0.0201	Bq/g	Composite
		SSNTLF-01-1Comp-1.5	4/4/2001	0.418	pCi/g	0.0155	Bq/g	Composite
		SSNTLF-01-2-0.5	4/18/2001	0.2	pCi/g	0.007	Bq/g	Single Point
		SSNTLF-01-2-1.5	4/18/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-20-0.5	4/23/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-20-1.5	4/23/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-21-0.5	4/23/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-21-1.5	4/23/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-22-0.5	4/23/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-22-1.5	4/23/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-22D-0.5	4/23/2001	< 0.2	pCi/g	< 0.007	Bq/g	Duplicate
		SSNTLF-01-22D-1.5	4/23/2001	< 0.2	pCi/g	< 0.007	Bq/g	Duplicate
		SSNTLF-01-23-0.5A	4/16/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-23-0.5B	4/16/2001	< 0.2	pCi/g	< 0.007	Bq/g	Split
		SSNTLF-01-23-0.5C	4/16/2001	< 0.2	pCi/g	< 0.007	Bq/g	Split
		SSNTLF-01-23-1.5A	4/16/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-23-1.5B	4/16/2001	< 0.2	pCi/g	< 0.007	Bq/g	Split
		SSNTLF-01-23-1.5C	4/16/2001	< 0.2	pCi/g	< 0.007	Bq/g	Split
		SSNTLF-01-24-0.5A	4/16/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-24-0.5B	4/16/2001	< 0.2	pCi/g	< 0.007	Bq/g	Split
		SSNTLF-01-24-0.5C	4/16/2001	< 0.2	pCi/g	< 0.007	Bq/g	Split
		SSNTLF-01-24-1.5A	4/16/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-24-1.5B	4/16/2001	< 0.2	pCi/g	< 0.007	Bq/g	Split
		SSNTLF-01-24-1.5C	4/16/2001	< 0.2	pCi/g	< 0.007	Bq/g	Split
		SSNTLF-01-25-0.5	5/3/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point

Sampling Program	Analyte	Location	Date	Conventional Result	Conventional Units	SI Units Result	SI Units Units	QA/Sample Type
Soil Monitoring	Tritiated Water	SSNTLF-01-25-1.5	5/3/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-25D-0.5	5/3/2001	< 0.2	pCi/g	< 0.007	Bq/g	Duplicate
		SSNTLF-01-25D-1.5	5/3/2001	< 0.2	pCi/g	< 0.007	Bq/g	Duplicate
		SSNTLF-01-26-0.5	5/3/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-26-1.5	5/3/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-27-0.5	5/3/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-27-1.5	5/3/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-28-0.5	4/24/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-28-1.5	4/24/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-29-0.5	4/24/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-29-1.5	4/24/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-3-0.5	4/16/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-3-1.5	4/16/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-30-0.5	4/23/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-30-1.5	4/23/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-31-0.5	4/24/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-31-1.5	4/24/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-32-0.5	4/27/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-32-1.5	4/27/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-33-0.5	4/23/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-33-1.5	4/23/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-34-0.5	4/23/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-34-1.5	4/23/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-35-0.5	4/23/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-35-1.5	4/23/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-36-0.5	5/1/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-36-1.5	5/1/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-36D-0.5	5/1/2001	< 0.2	pCi/g	< 0.007	Bq/g	Duplicate
		SSNTLF-01-36D-1.5	5/1/2001	< 0.2	pCi/g	< 0.007	Bq/g	Duplicate
		SSNTLF-01-37-0.5	5/1/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-37-1.5	5/1/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-38-0.5	4/27/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-38-1.5	4/27/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-39-0.5	4/23/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-39-1.5	4/23/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-4-0.5A	4/13/2001	0.3	pCi/g	0.011	Bq/g	Single Point
		SSNTLF-01-4-0.5B	4/13/2001	0.22	pCi/g	0.0081	Bq/g	Split
		SSNTLF-01-4-0.5C	4/13/2001	< 0.2	pCi/g	< 0.007	Bq/g	Split
		SSNTLF-01-4-1.5A	4/13/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-4-1.5B	4/13/2001	< 0.2	pCi/g	< 0.007	Bq/g	Split
		SSNTLF-01-4-1.5C	4/13/2001	< 0.2	pCi/g	< 0.007	Bq/g	Split
		SSNTLF-01-40-0.5	4/24/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-40-1.5	4/24/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-40D-0.5	4/24/2001	< 0.2	pCi/g	< 0.007	Bq/g	Duplicate

Sampling Program	Analyte	Location	Date	Conventional Result	Conventional Units	SI Units Result	SI Units Units	QA/Sample Type
Soil Monitoring	Tritiated Water	SSNTLF-01-40D-1.5	4/24/2001	< 0.2	pCi/g	< 0.007	Bq/g	Duplicate
		SSNTLF-01-41-0.5	4/23/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-41-1.5	4/23/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-42-0.5	5/4/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-42-1.5	5/4/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-42D-0.5	5/4/2001	< 0.2	pCi/g	< 0.007	Bq/g	Duplicate
		SSNTLF-01-42D-1.5	5/4/2001	< 0.2	pCi/g	< 0.007	Bq/g	Duplicate
		SSNTLF-01-43-0.5	4/18/2001	7.86	pCi/g	0.291	Bq/g	Single Point
		SSNTLF-01-43-1.5	4/18/2001	9.98	pCi/g	0.37	Bq/g	Single Point
		SSNTLF-01-44-0.5	4/13/2001	0.261	pCi/g	0.00967	Bq/g	Single Point
		SSNTLF-01-44-1.5	4/13/2001	0.405	pCi/g	0.015	Bq/g	Single Point
		SSNTLF-01-44D-0.5	4/13/2001	0.394	pCi/g	0.0146	Bq/g	Duplicate
		SSNTLF-01-44D-1.5	4/13/2001	0.306	pCi/g	0.0113	Bq/g	Duplicate
		SSNTLF-01-45-0.5A	4/13/2001	0.24	pCi/g	0.00889	Bq/g	Single Point
		SSNTLF-01-45-0.5B	4/13/2001	0.25	pCi/g	0.093	Bq/g	Split
		SSNTLF-01-45-0.5C	4/13/2001	< 0.2	pCi/g	< 0.007	Bq/g	Split
		SSNTLF-01-45-1.5A	4/13/2001	0.608	pCi/g	0.0225	Bq/g	Single Point
		SSNTLF-01-45-1.5B	4/13/2001	0.6	pCi/g	0.022	Bq/g	Split
		SSNTLF-01-45-1.5C	4/13/2001	0.59	pCi/g	0.0218	Bq/g	Split
		SSNTLF-01-46-0.5A	4/2/2001	4.06	pCi/g	0.15	Bq/g	Single Point
		SSNTLF-01-46-0.5B	4/2/2001	4.6	pCi/g	0.17	Bq/g	Split
		SSNTLF-01-46-0.5C	4/2/2001	3.53	pCi/g	0.131	Bq/g	Split
		SSNTLF-01-46-1.5A	4/2/2001	4.42	pCi/g	0.164	Bq/g	Single Point
		SSNTLF-01-46-1.5B	4/2/2001	4.38	pCi/g	0.162	Bq/g	Split
		SSNTLF-01-46-1.5C	4/2/2001	4.1	pCi/g	0.152	Bq/g	Split
		SSNTLF-01-47-0.5A	4/2/2001	0.799	pCi/g	0.0296	Bq/g	Single Point
		SSNTLF-01-47-0.5B	4/2/2001	0.28	pCi/g	0.0104	Bq/g	Split
		SSNTLF-01-47-1.5A	4/2/2001	0.763	pCi/g	0.0283	Bq/g	Single Point
		SSNTLF-01-47-1.5B	4/2/2001	0.43	pCi/g	0.0159	Bq/g	Split
		SSNTLF-01-47Comp-0.5A	4/2/2001	0.862	pCi/g	0.0319	Bq/g	Composite
		SSNTLF-01-47Comp-0.5B	4/2/2001	0.45	pCi/g	0.0167	Bq/g	Split
		SSNTLF-01-47Comp-0.5C	4/2/2001	0.5752	pCi/g	0.0213	Bq/g	Split
		SSNTLF-01-47Comp-1.5A	4/2/2001	0.935	pCi/g	0.0346	Bq/g	Composite
		SSNTLF-01-47Comp-1.5B	4/2/2001	0.27	pCi/g	0.01	Bq/g	Split
		SSNTLF-01-47Comp-1.5C	4/2/2001	0.6953	pCi/g	0.02575	Bq/g	Split
		SSNTLF-01-48-0.5A	4/2/2001	0.221	pCi/g	0.00819	Bq/g	Single Point
		SSNTLF-01-48-0.5B	4/2/2001	< 0.2	pCi/g	< 0.007	Bq/g	Split
		SSNTLF-01-48-1.5A	4/2/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-48-1.5B	4/2/2001	< 0.2	pCi/g	< 0.007	Bq/g	Split
		SSNTLF-01-48Comp-0.5A	4/2/2001	0.283	pCi/g	0.0105	Bq/g	Composite
		SSNTLF-01-48Comp-0.5B	4/2/2001	0.22	pCi/g	0.00815	Bq/g	Split
		SSNTLF-01-48Comp-0.5C	4/2/2001	< 0.2	pCi/g	< 0.007	Bq/g	Split
		SSNTLF-01-48Comp-1.5A	4/2/2001	< 0.2	pCi/g	< 0.007	Bq/g	Composite
		SSNTLF-01-48Comp-1.5B	4/2/2001	< 0.2	pCi/g	< 0.007	Bq/g	Split

Sampling Program	Analyte	Location	Date	Conventional Result	Units	SI Units Result	Units	QA/Sample Type
Soil Monitoring	Tritiated Water	SSNTLF-01-48Comp-1.5C	4/2/2001	0.28	pCi/g	0.0104	Bq/g	Split
		SSNTLF-01-49-0.5	5/3/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-49-1.5	5/3/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-49D-0.5	5/3/2001	< 0.2	pCi/g	< 0.007	Bq/g	Duplicate
		SSNTLF-01-49D-1.5	5/3/2001	< 0.2	pCi/g	< 0.007	Bq/g	Duplicate
		SSNTLF-01-5-0.5	4/12/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-5-1.5	4/12/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-50-0.5	5/4/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-50-1.5	5/4/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-50D-0.5	5/4/2001	< 0.2	pCi/g	< 0.007	Bq/g	Duplicate
		SSNTLF-01-50D-1.5	5/4/2001	< 0.2	pCi/g	< 0.007	Bq/g	Duplicate
		SSNTLF-01-51-0.5	5/4/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-51-1.5	5/4/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-52-0.5	5/3/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-52-1.5	5/3/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-52D-0.5	5/3/2001	< 0.2	pCi/g	< 0.007	Bq/g	Duplicate
		SSNTLF-01-52D-1.5	5/3/2001	< 0.2	pCi/g	< 0.007	Bq/g	Duplicate
		SSNTLF-01-53-0.5	5/4/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-53-1.5	5/4/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-54-0.5A	4/13/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-54-0.5B	4/13/2001	< 0.2	pCi/g	< 0.007	Bq/g	Split
		SSNTLF-01-54-0.5C	4/13/2001	< 0.2	pCi/g	< 0.007	Bq/g	Split
		SSNTLF-01-54-1.5A	4/13/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-54-1.5B	4/13/2001	< 0.2	pCi/g	< 0.007	Bq/g	Split
		SSNTLF-01-54-1.5C	4/13/2001	< 0.2	pCi/g	< 0.007	Bq/g	Split
		SSNTLF-01-55-0.5	5/4/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-55-1.5	5/4/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-56-0.5	5/4/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-56-1.5	5/4/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-56D-0.5	5/4/2001	< 0.2	pCi/g	< 0.007	Bq/g	Duplicate
		SSNTLF-01-56D-1.5	5/4/2001	< 0.2	pCi/g	< 0.007	Bq/g	Duplicate
		SSNTLF-01-57-0.5	4/13/2001	0.347	pCi/g	0.0129	Bq/g	Single Point
		SSNTLF-01-57-1.5	4/13/2001	0.341	pCi/g	0.0126	Bq/g	Single Point
		SSNTLF-01-58-0.5	4/13/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-58-1.5	4/13/2001	0.276	pCi/g	0.0102	Bq/g	Single Point
		SSNTLF-01-59-0.5	4/13/2001	1.06	pCi/g	0.0393	Bq/g	Single Point
		SSNTLF-01-59-1.5	4/13/2001	1.3	pCi/g	0.0481	Bq/g	Single Point
		SSNTLF-01-6-0.5	4/18/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-6-1.5	4/18/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-60-0.5	4/18/2001	0.746	pCi/g	0.0276	Bq/g	Single Point
		SSNTLF-01-60-1.5	4/18/2001	0.977	pCi/g	0.0362	Bq/g	Single Point
		SSNTLF-01-61-0.5	4/18/2001	2.84	pCi/g	0.105	Bq/g	Single Point
		SSNTLF-01-61-1.5	4/18/2001	1.86	pCi/g	0.0689	Bq/g	Single Point
		SSNTLF-01-62-0.5	4/4/2001	1.67	pCi/g	0.0619	Bq/g	Single Point

Sampling Program	Analyte	Location	Date	Conventional Result	Conventional Units	SI Units Result	SI Units Units	QA/Sample Type
Soil Monitoring	Tritiated Water	SSNTLF-01-62-1.5	4/4/2001	1.67	pCi/g	0.0619	Bq/g	Single Point
		SSNTLF-01-62Comp-0.5	4/4/2001	2.18	pCi/g	0.0807	Bq/g	Composite
		SSNTLF-01-62Comp-1.5	4/4/2001	2.15	pCi/g	0.0796	Bq/g	Composite
		SSNTLF-01-63-0.5	4/6/2001	0.644	pCi/g	0.0239	Bq/g	Single Point
		SSNTLF-01-63-1.5	4/6/2001	0.696	pCi/g	0.0258	Bq/g	Single Point
		SSNTLF-01-63Comp-0.5	4/6/2001	0.54	pCi/g	0.02	Bq/g	Composite
		SSNTLF-01-63Comp-1.5	4/6/2001	0.634	pCi/g	0.0235	Bq/g	Composite
		SSNTLF-01-64-0.5	4/6/2001	0.296	pCi/g	0.012	Bq/g	Single Point
		SSNTLF-01-64-1.5	4/19/2001	0.297	pCi/g	0.011	Bq/g	Single Point
		SSNTLF-01-65-0.5	4/17/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-65-1.5	4/17/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-66-0.5	4/17/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-66-1.5	4/17/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-7-0.5A	4/13/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-7-0.5B	4/13/2001	< 0.2	pCi/g	< 0.007	Bq/g	Split
		SSNTLF-01-7-0.5C	4/13/2001	0.28	pCi/g	0.0104	Bq/g	Split
		SSNTLF-01-7-1.5A	4/13/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-7-1.5B	4/13/2001	< 0.2	pCi/g	< 0.007	Bq/g	Split
		SSNTLF-01-7-1.5C	4/13/2001	< 0.2	pCi/g	< 0.007	Bq/g	Split
		SSNTLF-01-8-0.5	4/18/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-8-1.5	4/18/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-9-0.5	4/12/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		SSNTLF-01-9-1.5	4/12/2001	< 0.2	pCi/g	< 0.007	Bq/g	Single Point
		WWNTLF-01-401	4/3/2001	< 200	pCi/L	< 7	Bq/L	Blank
		WWNTLF-01-402	4/4/2001	< 200	pCi/L	< 7	Bq/L	Blank
		WWNTLF-01-403	4/6/2001	< 200	pCi/L	< 7	Bq/L	Blank
		WWNTLF-01-404	4/10/2001	< 200	pCi/L	< 7	Bq/L	Blank
		WWNTLF-01-405	4/10/2001	< 200	pCi/L	< 7	Bq/L	Blank
		WWNTLF-01-406	4/11/2001	< 200	pCi/L	< 7	Bq/L	Blank
		WWNTLF-01-407	4/12/2001	< 200	pCi/L	< 7	Bq/L	Blank
		WWNTLF-01-408	4/16/2001	< 200	pCi/L	< 7	Bq/L	Blank
		WWNTLF-01-409	4/17/2001	< 200	pCi/L	< 7	Bq/L	Blank
		WWNTLF-01-410	4/17/2001	< 200	pCi/L	< 7	Bq/L	Blank
		WWNTLF-01-411	4/18/2001	< 200	pCi/L	< 7	Bq/L	Blank
		WWNTLF-01-412	4/24/2001	< 200	pCi/L	< 7	Bq/L	Blank
		WWNTLF-01-413	4/24/2001	< 200	pCi/L	< 7	Bq/L	Blank
		WWNTLF-01-414	4/30/2001	< 200	pCi/L	< 7	Bq/L	Blank
		WWNTLF-01-415	5/2/2001	< 200	pCi/L	< 7	Bq/L	Blank
		WWNTLF-01-416	5/4/2001	< 200	pCi/L	< 7	Bq/L	Blank
		WWNTLF-01-417	5/4/2001	< 200	pCi/L	< 7	Bq/L	Blank
Surface Water	Tritiated Water	Banana Creek	4/10/2001	< 200	pCi/L	< 7	Bq/L	Duplicate
			4/10/2001	< 200	pCi/L	< 7	Bq/L	Sample
			8/31/2001	< 200	pCi/L	< 7	Bq/L	Duplicate
			8/31/2001	< 200	pCi/L	< 7	Bq/L	Sample

Sampling Program	Analyte	Location	Date	Conventional Result	Conventional Units	SI Units Result	SI Units Units	QA/Sample Type
Surface Water	Tritiated Water	Cafeteria Creek (Lower)	4/9/2001	< 200	pCi/L	< 7	Bq/L	Sample
		Cafeteria Creek (Upper)	4/9/2001	< 200	pCi/L	< 7	Bq/L	Sample
		Chicken Creek (Lower)	4/10/2001	290	pCi/L	10.7	Bq/L	Duplicate
			4/10/2001	391	pCi/L	14.5	Bq/L	Sample
			9/4/2001	269	pCi/L	9.96	Bq/L	Duplicate
			9/4/2001	296	pCi/L	11	Bq/L	Sample
			10/29/2001	328	pCi/L	12.1	Bq/L	Duplicate
			10/29/2001	277	pCi/L	10.3	Bq/L	Sample
			11/28/2001	373	pCi/L	13.8	Bq/L	Duplicate
			11/28/2001	544	pCi/L	20.1	Bq/L	Sample
			12/18/2001	429	pCi/L	15.9	Bq/L	Sample
			1/30/2002	413	pCi/L	15.3	Bq/L	Duplicate
			1/30/2002	538	pCi/L	19.9	Bq/L	Sample
			2/26/2002	268	pCi/L	9.93	Bq/L	Sample
			3/28/2002	487	pCi/L	18	Bq/L	Duplicate
			3/28/2002	502	pCi/L	18.6	Bq/L	Sample
			4/29/2002	< 200	pCi/L	< 7	Bq/L	Sample
		Chicken Creek (Upper)	4/9/2001	233	pCi/L	8.63	Bq/L	Sample
			4/9/2001	316	pCi/L	11.7	Bq/L	Split
			4/9/2001	378	pCi/L	14	Bq/L	Split
			8/31/2001	< 200	pCi/L	< 7	Bq/L	Sample
			8/31/2001	365	pCi/L	13.5	Bq/L	Split
			8/31/2001	< 200	pCi/L	< 7	Bq/L	Split
			10/29/2001	< 200	pCi/L	< 7	Bq/L	Sample
			10/29/2001	271	pCi/L	10	Bq/L	Split
			10/29/2001	< 200	pCi/L	< 7	Bq/L	Split
			11/28/2001	260	pCi/L	9.63	Bq/L	Sample
			11/28/2001	334	pCi/L	12.4	Bq/L	Split
			11/28/2001	418	pCi/L	15.5	Bq/L	Split
			12/18/2001	320	pCi/L	11.9	Bq/L	Sample
			1/30/2002	261	pCi/L	9.67	Bq/L	Sample
			1/30/2002	384	pCi/L	14.2	Bq/L	Split
			1/30/2002	354	pCi/L	13.1	Bq/L	Split
			2/26/2002	327	pCi/L	12.1	Bq/L	Sample
			3/28/2002	238	pCi/L	8.81	Bq/L	Sample
			3/28/2002	283	pCi/L	10.5	Bq/L	Split
			3/28/2002	327	pCi/L	12.1	Bq/L	Split
			4/29/2002	< 200	pCi/L	< 7	Bq/L	Sample
		Field Blank	9/4/2001	< 200	pCi/L	< 7	Bq/L	Blank
			9/4/2001	< 200	pCi/L	< 7	Bq/L	Blank
			9/5/2001	< 200	pCi/L	< 7	Bq/L	Blank
			10/29/2001	< 200	pCi/L	< 7	Bq/L	Blank
			11/28/2001	< 200	pCi/L	< 7	Bq/L	Blank
			12/18/2001	< 200	pCi/L	< 7	Bq/L	Blank

Sampling Program	Analyte	Location	Date	Conventional Result	Conventional Units	SI Units Result	SI Units Units	QA/Sample Type
Surface Water	Tritiated Water	Field Blank	1/30/2002	< 200	pCi/L	< 7	Bq/L	Blank
			2/27/2002	< 200	pCi/L	< 7	Bq/L	Blank
			3/28/2002	< 200	pCi/L	< 7	Bq/L	Blank
			4/29/2002	< 200	pCi/L	< 7	Bq/L	Blank
		Lake Anza	4/9/2001	< 200	pCi/L	< 7	Bq/L	Sample
			9/4/2001	< 200	pCi/L	< 7	Bq/L	Sample
		Lake Temescal	4/9/2001	< 200	pCi/L	< 7	Bq/L	Sample
			9/5/2001	< 200	pCi/L	< 7	Bq/L	Sample
		N. Fork Strawberry (Lower)	4/9/2001	< 200	pCi/L	< 7	Bq/L	Duplicate
			4/9/2001	< 200	pCi/L	< 7	Bq/L	Sample
			8/31/2001	< 200	pCi/L	< 7	Bq/L	Duplicate
			8/31/2001	< 200	pCi/L	< 7	Bq/L	Sample
			10/29/2001	209	pCi/L	7.74	Bq/L	Duplicate
			10/29/2001	< 200	pCi/L	< 7	Bq/L	Sample
			11/28/2001	< 200	pCi/L	< 7	Bq/L	Duplicate
			11/28/2001	269	pCi/L	9.96	Bq/L	Sample
			12/18/2001	< 200	pCi/L	< 7	Bq/L	Sample
			1/30/2002	273	pCi/L	10.1	Bq/L	Duplicate
			1/30/2002	365	pCi/L	13.5	Bq/L	Sample
			2/26/2002	201	pCi/L	7.44	Bq/L	Sample
			3/28/2002	< 200	pCi/L	< 7	Bq/L	Duplicate
			3/28/2002	< 200	pCi/L	< 7	Bq/L	Sample
			4/29/2002	< 200	pCi/L	< 7	Bq/L	Sample
		N. Fork Strawberry (Upper)	4/9/2001	< 200	pCi/L	< 7	Bq/L	Sample
			8/31/2001	< 200	pCi/L	< 7	Bq/L	Sample
			10/29/2001	< 200	pCi/L	< 7	Bq/L	Sample
			11/28/2001	207	pCi/L	7.67	Bq/L	Sample
			12/18/2001	< 200	pCi/L	< 7	Bq/L	Sample
			1/30/2002	271	pCi/L	10	Bq/L	Sample
			2/26/2002	218	pCi/L	8.07	Bq/L	Sample
			3/28/2002	< 200	pCi/L	< 7	Bq/L	Sample
			4/29/2002	< 200	pCi/L	< 7	Bq/L	Sample
		No Name Creek (Lower)	4/10/2001	< 200	pCi/L	< 7	Bq/L	Sample
			9/4/2001	< 200	pCi/L	< 7	Bq/L	Sample
		No Name Creek (Upper)	4/10/2001	< 200	pCi/L	< 7	Bq/L	Sample
			9/4/2001	< 200	pCi/L	< 7	Bq/L	Sample
		Pineapple Creek	4/10/2001	< 200	pCi/L	< 7	Bq/L	Sample
			8/31/2001	< 200	pCi/L	< 7	Bq/L	Sample
		Ravine Creek (Lower)	4/9/2001	< 200	pCi/L	< 7	Bq/L	Sample
			4/9/2001	< 200	pCi/L	< 7	Bq/L	Split
			4/9/2001	< 200	pCi/L	< 7	Bq/L	Split
		Ravine Creek (Upper)	4/9/2001	< 200	pCi/L	< 7	Bq/L	Sample
		Strawberry Creek Outfall	4/9/2001	< 200	pCi/L	< 7	Bq/L	Sample
			4/9/2001	< 200	pCi/L	< 7	Bq/L	Split

Sampling Program	Analyte	Location	Date	Conventional Result	Conventional Units	SI Units Result	SI Units Units	QA/Sample Type
Surface Water	Tritiated Water	Strawberry Creek Outfall	9/4/2001	< 200	pCi/L	< 7	Bq/L	Sample
			10/29/2001	< 200	pCi/L	< 7	Bq/L	Sample
			11/28/2001	< 200	pCi/L	< 7	Bq/L	Sample
			12/18/2001	< 200	pCi/L	< 7	Bq/L	Duplicate
			12/18/2001	< 200	pCi/L	< 7	Bq/L	Sample
			1/30/2002	< 200	pCi/L	< 7	Bq/L	Duplicate
			1/30/2002	< 200	pCi/L	< 7	Bq/L	Sample
			2/27/2002	< 200	pCi/L	< 7	Bq/L	Sample
			3/28/2002	< 200	pCi/L	< 7	Bq/L	Sample
			4/29/2002	< 200	pCi/L	< 7	Bq/L	Sample
		Strawberry Creek UC	4/9/2001	< 200	pCi/L	< 7	Bq/L	Sample
			4/9/2001	< 200	pCi/L	< 7	Bq/L	Split
			9/4/2001	< 200	pCi/L	< 7	Bq/L	Sample
			10/29/2001	< 200	pCi/L	< 7	Bq/L	Sample
			11/28/2001	< 200	pCi/L	< 7	Bq/L	Sample
			12/18/2001	< 200	pCi/L	< 7	Bq/L	Duplicate
			12/18/2001	< 200	pCi/L	< 7	Bq/L	Sample
			1/30/2002	< 200	pCi/L	< 7	Bq/L	Sample
			2/27/2002	< 200	pCi/L	< 7	Bq/L	Sample
			3/28/2002	< 200	pCi/L	< 7	Bq/L	Sample
			4/29/2002	< 200	pCi/L	< 7	Bq/L	Sample
		Ten Inch Creek (Lower)	4/11/2001	< 200	pCi/L	< 7	Bq/L	Sample
		Ten Inch Creek (Upper)	4/11/2001	< 200	pCi/L	< 7	Bq/L	Sample
Vegetation Monitoring	OBT	EEE6-Chip	9/12/2001	4.7	pCi/g	0.17	Bq/g	Sample
			11/28/2001	< 5	pCi/g	< 0.17	Bq/g	Sample
		EEE6-Duff	9/12/2001	15	pCi/g	0.55	Bq/g	Sample
			11/28/2001	9.4	pCi/g	0.35	Bq/g	Sample
		EEE6-Leaf	9/12/2001	7.1	pCi/g	0.26	Bq/g	Sample
			11/28/2001	10	pCi/g	0.39	Bq/g	Sample
		NEE10-Chip	9/12/2001	< 4	pCi/g	< 0.14	Bq/g	Sample
			11/27/2001	< 4	pCi/g	< 0.15	Bq/g	Sample
		NEE10-Duff	9/12/2001	< 4	pCi/g	< 0.14	Bq/g	Sample
			11/27/2001	< 5	pCi/g	< 0.17	Bq/g	Sample
		NEE10-Leaf	9/12/2001	< 3	pCi/g	< 0.13	Bq/g	Sample
			11/27/2001	< 4	pCi/g	< 0.15	Bq/g	Sample
		NNN5-Chip	9/13/2001	< 3	pCi/g	< 0.11	Bq/g	Sample
			11/29/2001	< 4	pCi/g	< 0.15	Bq/g	Sample
			11/29/2001	1.12	pCi/g	0.0415	Bq/g	Split
		NNN5-Duff	9/13/2001	83.9	pCi/g	3.11	Bq/g	Sample
			11/29/2001	77.7	pCi/g	2.88	Bq/g	Sample
			11/29/2001	62.2	pCi/g	2.3	Bq/g	Split
		NNN5-Leaf	9/13/2001	30.4	pCi/g	1.13	Bq/g	Sample
			11/29/2001	40	pCi/g	1.48	Bq/g	Sample
			11/29/2001	16	pCi/g	0.593	Bq/g	Split

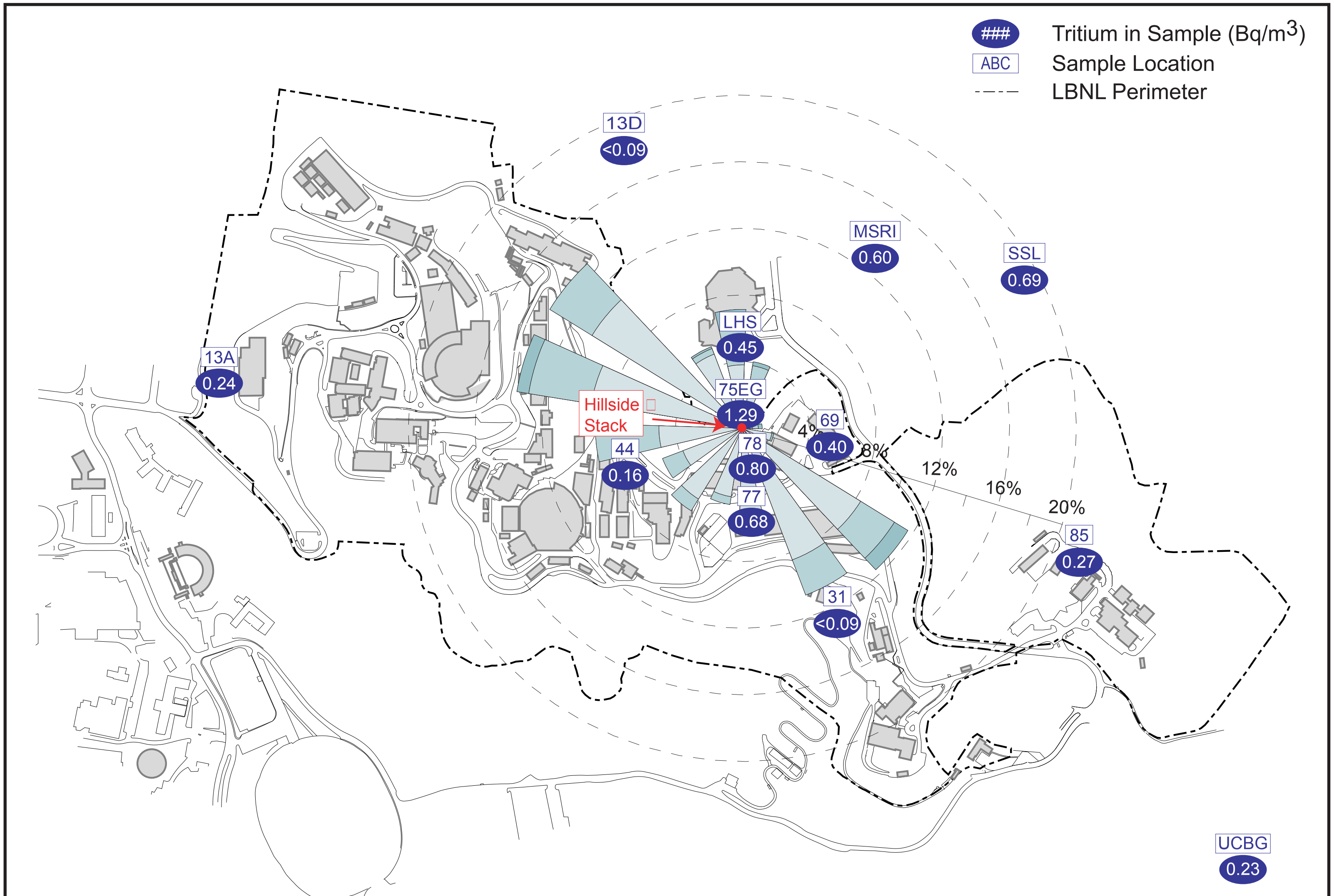
Sampling Program	Analyte	Location	Date	Conventional Result	Units	SI Units Result	Units	QA/Sample Type
Vegetation Monitoring	OBT	NNW1-Chip	9/13/2001	< 4	pCi/g	< 0.16	Bq/g	Duplicate
			9/13/2001	4.3	pCi/g	0.16	Bq/g	Sample
			11/29/2001	< 4	pCi/g	< 0.15	Bq/g	Duplicate
			11/29/2001	5.4	pCi/g	0.2	Bq/g	Sample
			11/29/2001	3.87	pCi/g	0.143	Bq/g	Split
		NNW1-Duff	9/13/2001	292	pCi/g	10.8	Bq/g	Duplicate
			9/13/2001	238	pCi/g	8.81	Bq/g	Sample
			11/29/2001	142	pCi/g	5.26	Bq/g	Duplicate
			11/29/2001	119	pCi/g	4.41	Bq/g	Sample
			11/29/2001	132	pCi/g	4.89	Bq/g	Split
		NNW1-Leaf	9/13/2001	48.8	pCi/g	1.81	Bq/g	Duplicate
			9/13/2001	40.8	pCi/g	1.51	Bq/g	Sample
			11/29/2001	44.9	pCi/g	1.66	Bq/g	Duplicate
			11/29/2001	28.5	pCi/g	1.06	Bq/g	Sample
			11/29/2001	39	pCi/g	1.44	Bq/g	Split
		NNW2-Chip	9/13/2001	< 4	pCi/g	< 0.14	Bq/g	Sample
			9/13/2001	0.81	pCi/g	0.03	Bq/g	Split
			11/29/2001	< 4	pCi/g	< 0.15	Bq/g	Sample
			11/29/2001	1.01	pCi/g	0.0374	Bq/g	Split
		NNW2-Duff	9/13/2001	24.2	pCi/g	0.896	Bq/g	Sample
			9/13/2001	38	pCi/g	1.41	Bq/g	Split
			11/29/2001	24.1	pCi/g	0.893	Bq/g	Sample
			11/29/2001	57.2	pCi/g	2.12	Bq/g	Split
		NNW2-Leaf	9/13/2001	23.6	pCi/g	0.874	Bq/g	Sample
			9/13/2001	16.5	pCi/g	0.61	Bq/g	Split
			11/29/2001	23.3	pCi/g	0.863	Bq/g	Sample
			11/29/2001	19.1	pCi/g	0.706	Bq/g	Split
		NNW3-Chip	9/12/2001	< 4	pCi/g	< 0.14	Bq/g	Sample
			11/29/2001	< 4	pCi/g	< 0.16	Bq/g	Sample
		NNW3-Duff	9/12/2001	< 4	pCi/g	< 0.14	Bq/g	Sample
			11/29/2001	< 4	pCi/g	< 0.15	Bq/g	Sample
		NNW3-Leaf	9/12/2001	< 3	pCi/g	< 0.1	Bq/g	Sample
			11/29/2001	< 4	pCi/g	< 0.13	Bq/g	Sample
		SEE9-Chip	9/12/2001	< 3	pCi/g	< 0.12	Bq/g	Sample
			11/27/2001	< 4	pCi/g	< 0.16	Bq/g	Sample
		SEE9-Duff	9/12/2001	< 4	pCi/g	< 0.16	Bq/g	Sample
			11/27/2001	< 4	pCi/g	< 0.14	Bq/g	Sample
		SEE9-Leaf	9/12/2001	< 3	pCi/g	< 0.12	Bq/g	Sample
			11/27/2001	< 4	pCi/g	< 0.14	Bq/g	Sample
		SSE7-Chip	9/12/2001	< 3	pCi/g	< 0.13	Bq/g	Sample
			11/28/2001	< 4	pCi/g	< 0.15	Bq/g	Sample
		SSE7-Duff	9/12/2001	< 4	pCi/g	< 0.14	Bq/g	Sample
			11/28/2001	< 4	pCi/g	< 0.16	Bq/g	Sample
		SSE7-Leaf	9/12/2001	4.6	pCi/g	0.17	Bq/g	Sample

Sampling Program	Analyte	Location	Date	Conventional Result	Conventional Units	SI Units Result	SI Units Units	QA/Sample Type
Vegetation Monitoring	OBT	SSE7-Leaf	11/28/2001	< 4	pCi/g	< 0.15	Bq/g	Sample
		WNW4-Chip	9/13/2001	< 3	pCi/g	< 0.13	Bq/g	Sample
			11/28/2001	< 4	pCi/g	< 0.16	Bq/g	Sample
		WNW4-Duff	9/13/2001	13	pCi/g	0.49	Bq/g	Sample
			11/28/2001	12	pCi/g	0.46	Bq/g	Sample
		WNW4-Leaf	9/13/2001	17.7	pCi/g	0.656	Bq/g	Sample
			11/28/2001	25.2	pCi/g	0.933	Bq/g	Sample
		WWW8-Chip	9/12/2001	< 3	pCi/g	< 0.12	Bq/g	Sample
			11/28/2001	< 4	pCi/g	< 0.16	Bq/g	Sample
		WWW8-Duff	9/12/2001	< 4	pCi/g	< 0.13	Bq/g	Sample
			11/28/2001	< 4	pCi/g	< 0.14	Bq/g	Sample
		WWW8-Leaf	9/12/2001	< 3	pCi/g	< 0.11	Bq/g	Sample
			11/28/2001	< 4	pCi/g	< 0.15	Bq/g	Sample
	Tritiated Water	EEE6-Chip	9/12/2001	0.19	pCi/g	0.0069	Bq/g	Sample
			11/28/2001	0.21	pCi/g	0.0079	Bq/g	Sample
		EEE6-Duff	9/12/2001	0.14	pCi/g	0.005	Bq/g	Sample
			11/28/2001	0.59	pCi/g	0.022	Bq/g	Sample
		EEE6-Leaf	9/12/2001	0.726	pCi/g	0.0269	Bq/g	Sample
			11/28/2001	0.36	pCi/g	0.013	Bq/g	Sample
		NEE10-Chip	9/12/2001	< 0.14	pCi/g	< 0.005	Bq/g	Sample
			11/27/2001	< 0.13	pCi/g	< 0.005	Bq/g	Sample
		NEE10-Duff	9/12/2001	< 0.1	pCi/g	< 0.004	Bq/g	Sample
			11/27/2001	0.22	pCi/g	0.0081	Bq/g	Sample
		NEE10-Leaf	9/12/2001	< 0.14	pCi/g	< 0.005	Bq/g	Sample
			11/27/2001	< 0.13	pCi/g	< 0.005	Bq/g	Sample
		NEE10-TW	9/19/2001	< 180	pCi/L	< 7	Bq/L	Sample
			1/17/2002	< 180	pCi/L	< 7	Bq/L	Sample
		NNN5-Chip	9/13/2001	4.17	pCi/g	0.154	Bq/g	Sample
			11/29/2001	4.49	pCi/g	0.166	Bq/g	Sample
			11/29/2001	4.52	pCi/g	0.167	Bq/g	Split
		NNN5-Duff	9/13/2001	1.41	pCi/g	0.0522	Bq/g	Sample
			11/29/2001	4.57	pCi/g	0.169	Bq/g	Sample
			11/29/2001	3.66	pCi/g	0.136	Bq/g	Split
		NNN5-Leaf	9/13/2001	5.13	pCi/g	0.19	Bq/g	Sample
			11/29/2001	5.01	pCi/g	0.186	Bq/g	Sample
			11/29/2001	18.8	pCi/g	0.694	Bq/g	Split
		NNW1-Chip	9/13/2001	8.35	pCi/g	0.309	Bq/g	Duplicate
			9/13/2001	9.58	pCi/g	0.355	Bq/g	Sample
			11/29/2001	9.54	pCi/g	0.353	Bq/g	Duplicate
			11/29/2001	8.67	pCi/g	0.321	Bq/g	Sample
			11/29/2001	10.1	pCi/g	0.375	Bq/g	Split
		NNW1-Duff	9/13/2001	1.67	pCi/g	0.0619	Bq/g	Duplicate
			9/13/2001	1.22	pCi/g	0.0452	Bq/g	Sample
			11/29/2001	9.3	pCi/g	0.344	Bq/g	Duplicate

Sampling Program	Analyte	Location	Date	Conventional Result	Units	SI Units Result	Units	QA/Sample Type
Vegetation Monitoring	Tritiated Water	NNW1-Duff	11/29/2001	9.26	pCi/g	0.343	Bq/g	Sample
			11/29/2001	6.64	pCi/g	0.246	Bq/g	Split
		NNW1-Leaf	9/13/2001	6.03	pCi/g	0.223	Bq/g	Duplicate
			9/13/2001	8.92	pCi/g	0.33	Bq/g	Sample
			11/29/2001	9.19	pCi/g	0.34	Bq/g	Duplicate
			11/29/2001	8.97	pCi/g	0.332	Bq/g	Sample
			11/29/2001	21.1	pCi/g	0.78	Bq/g	Split
		NNW1-TW	9/24/2001	13600	pCi/L	504	Bq/L	Sample
			9/24/2001	13000	pCi/L	481	Bq/L	Duplicate
			1/3/2002	11400	pCi/L	422	Bq/L	Duplicate
			1/3/2002	8750	pCi/L	324	Bq/L	Sample
			1/3/2002	9610	pCi/L	356	Bq/L	Split
		NNW2-Chip	9/13/2001	2.17	pCi/g	0.0804	Bq/g	Sample
			9/13/2001	1.74	pCi/g	0.0644	Bq/g	Split
			11/29/2001	1.82	pCi/g	0.0674	Bq/g	Sample
			11/29/2001	2.03	pCi/g	0.0752	Bq/g	Split
		NNW2-Duff	9/13/2001	1.01	pCi/g	0.0374	Bq/g	Sample
			9/13/2001	2.08	pCi/g	0.077	Bq/g	Split
			11/29/2001	3.56	pCi/g	0.132	Bq/g	Sample
			11/29/2001	2.61	pCi/g	0.0967	Bq/g	Split
		NNW2-Leaf	9/13/2001	2.58	pCi/g	0.0956	Bq/g	Sample
			9/13/2001	5.07	pCi/g	0.188	Bq/g	Split
			11/29/2001	4.1	pCi/g	0.152	Bq/g	Sample
			11/29/2001	2.35	pCi/g	0.087	Bq/g	Split
		NNW2-TW	9/24/2001	3690	pCi/L	137	Bq/L	Sample
			9/24/2001	3710	pCi/L	137	Bq/L	Split
			1/3/2002	3920	pCi/L	145	Bq/L	Sample
			1/3/2002	3750	pCi/L	139	Bq/L	Split
		NNW3-Chip	9/12/2001	0.16	pCi/g	0.0059	Bq/g	Sample
			11/29/2001	< 0.13	pCi/g	< 0.005	Bq/g	Sample
		NNW3-Duff	9/12/2001	0.454	pCi/g	0.0168	Bq/g	Sample
			11/29/2001	0.12	pCi/g	0.0044	Bq/g	Sample
		NNW3-Leaf	9/12/2001	0.26	pCi/g	0.0097	Bq/g	Sample
			11/29/2001	0.41	pCi/g	0.015	Bq/g	Sample
		NNW3-TW	9/19/2001	430	pCi/L	16	Bq/L	Sample
			1/3/2002	380	pCi/L	14	Bq/L	Sample
		SEE9-Chip	9/12/2001	< 0.14	pCi/g	< 0.005	Bq/g	Sample
			11/27/2001	< 0.12	pCi/g	< 0.005	Bq/g	Sample
		SEE9-Duff	9/12/2001	< 0.1	pCi/g	< 0.004	Bq/g	Sample
			11/27/2001	0.1	pCi/g	0.004	Bq/g	Sample
		SEE9-Leaf	9/12/2001	< 0.14	pCi/g	< 0.005	Bq/g	Sample
			11/27/2001	< 0.12	pCi/g	< 0.004	Bq/g	Sample
		SEE9-TW	9/19/2001	< 180	pCi/L	< 7	Bq/L	Sample
			1/3/2002	< 180	pCi/L	< 7	Bq/L	Sample

Sampling Program	Analyte	Location	Date	Conventional Result	Conventional Units	SI Units Result	SI Units Units	QA/Sample Type
Vegetation Monitoring	Tritiated Water	SSE7-Chip	9/12/2001	< 0.14	pCi/g	< 0.005	Bq/g	Sample
			11/28/2001	< 0.14	pCi/g	< 0.005	Bq/g	Sample
		SSE7-Duff	9/12/2001	< 0.11	pCi/g	< 0.004	Bq/g	Sample
			11/28/2001	< 0.13	pCi/g	< 0.005	Bq/g	Sample
		SSE7-Leaf	9/12/2001	< 0.14	pCi/g	< 0.005	Bq/g	Sample
			11/28/2001	< 0.13	pCi/g	< 0.005	Bq/g	Sample
		WNW4-Chip	9/13/2001	0.802	pCi/g	0.0297	Bq/g	Sample
			11/28/2001	0.624	pCi/g	0.0231	Bq/g	Sample
		WNW4-Duff	9/13/2001	1.49	pCi/g	0.0552	Bq/g	Sample
			11/28/2001	1.35	pCi/g	0.05	Bq/g	Sample
		WNW4-Leaf	9/13/2001	2.46	pCi/g	0.0911	Bq/g	Sample
			11/28/2001	1.3	pCi/g	0.0481	Bq/g	Sample
		WWW8-Chip	9/12/2001	< 0.14	pCi/g	< 0.005	Bq/g	Sample
			11/28/2001	< 0.12	pCi/g	< 0.005	Bq/g	Sample
		WWW8-Duff	9/12/2001	< 0.1	pCi/g	< 0.004	Bq/g	Sample
			11/28/2001	< 0.14	pCi/g	< 0.005	Bq/g	Sample
		WWW8-Leaf	9/12/2001	< 0.14	pCi/g	< 0.005	Bq/g	Sample
			11/28/2001	0.24	pCi/g	0.009	Bq/g	Sample

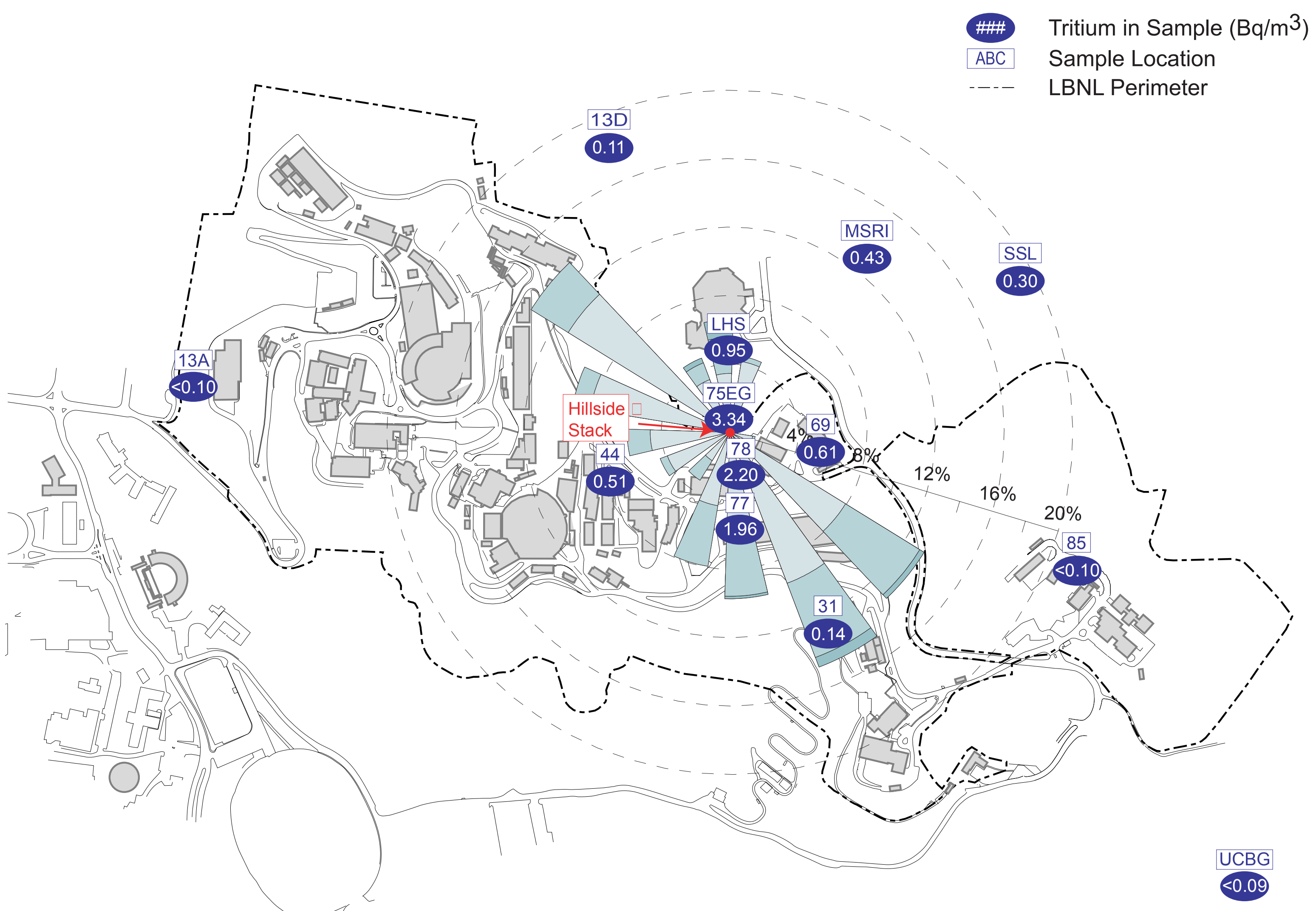
APPENDIX B: MONTHLY AMBIENT AIR RESULTS PLOTTED ON BERKELEY LAB MAPS



NOTE:

1) Emissions during period totalled 19.6 gigabecquerels (1 Bq = 27 pCi; 1 GBq = 0.027 Ci).
2) Spikes indicate wind direction (from) and colors represent standard wind speed categories.
3) Results are for primary sample only. Some results depicted may differ slightly from the value listed in Appendix A due to rounding. Values with the "<" symbol represent results below the analytical detection limit.

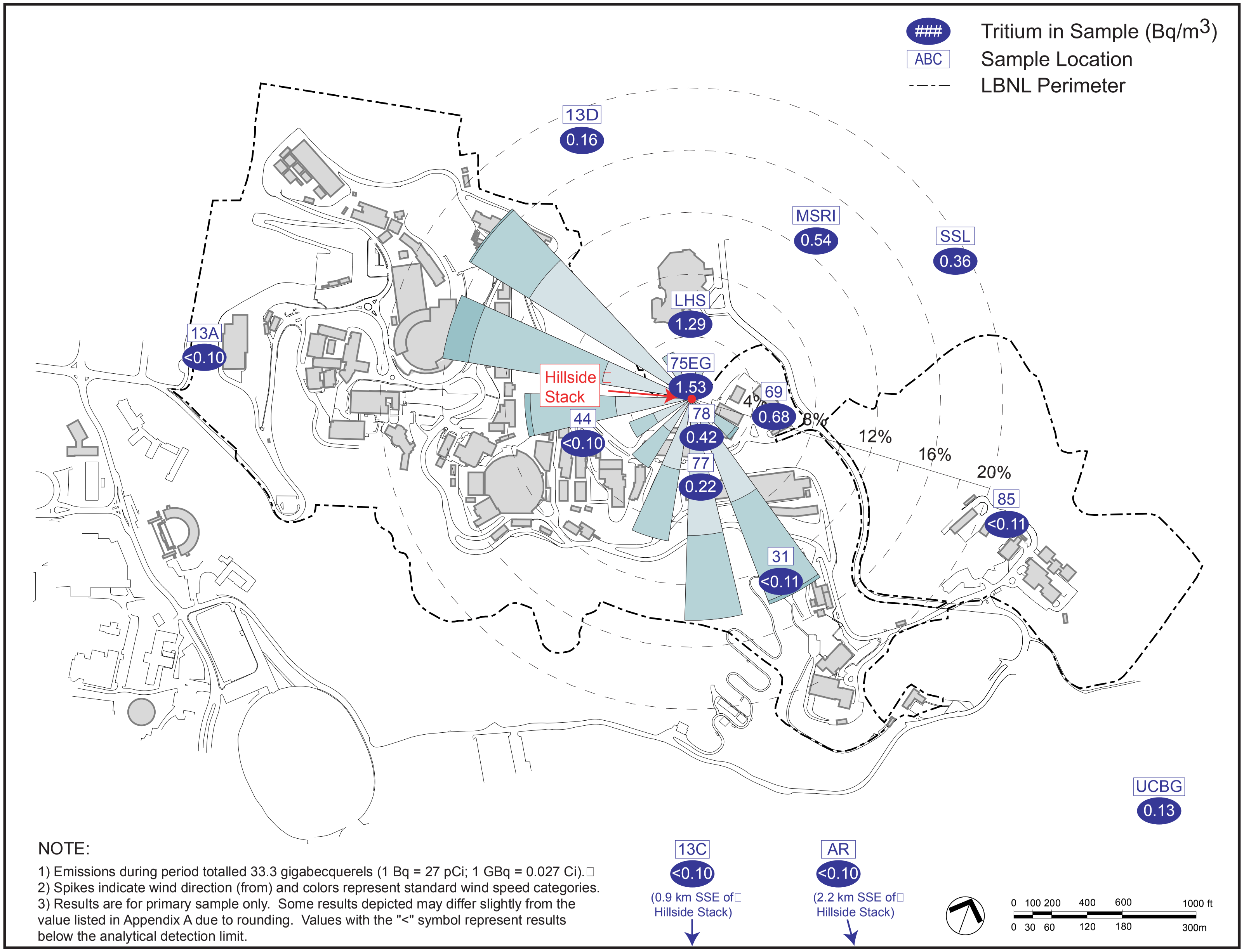
Figure B-1 Ambient Air Tritium (Tritiated Water) Along With Wind Distribution Patterns for Monthly Sampling During May 2001



NOTE:

1) Emissions during period totalled 44.8 gigabecquerels (1 Bq = 27 pCi; 1 GBq = 0.027 Ci).
2) Spikes indicate wind direction (from) and colors represent standard wind speed categories.
3) Results are for primary sample only. Some results depicted may differ slightly from the value listed in Appendix A due to rounding. Values with the "<" symbol represent results below the analytical detection limit.

Figure B-2 Ambient Air Tritium (Tritiated Water) Along With Wind Distribution Patterns for Monthly Sampling During June 2001



NOTE:

1) Emissions during period totalled 33.3 gigabecquerels (1 Bq = 27 pCi; 1 GBq = 0.027 Ci).
2) Spikes indicate wind direction (from) and colors represent standard wind speed categories.
3) Results are for primary sample only. Some results depicted may differ slightly from the value listed in Appendix A due to rounding. Values with the "<" symbol represent results below the analytical detection limit.

Figure B-3 Ambient Air Tritium (Tritiated Water) Along With Wind Distribution Patterns for Monthly Sampling During July 2001

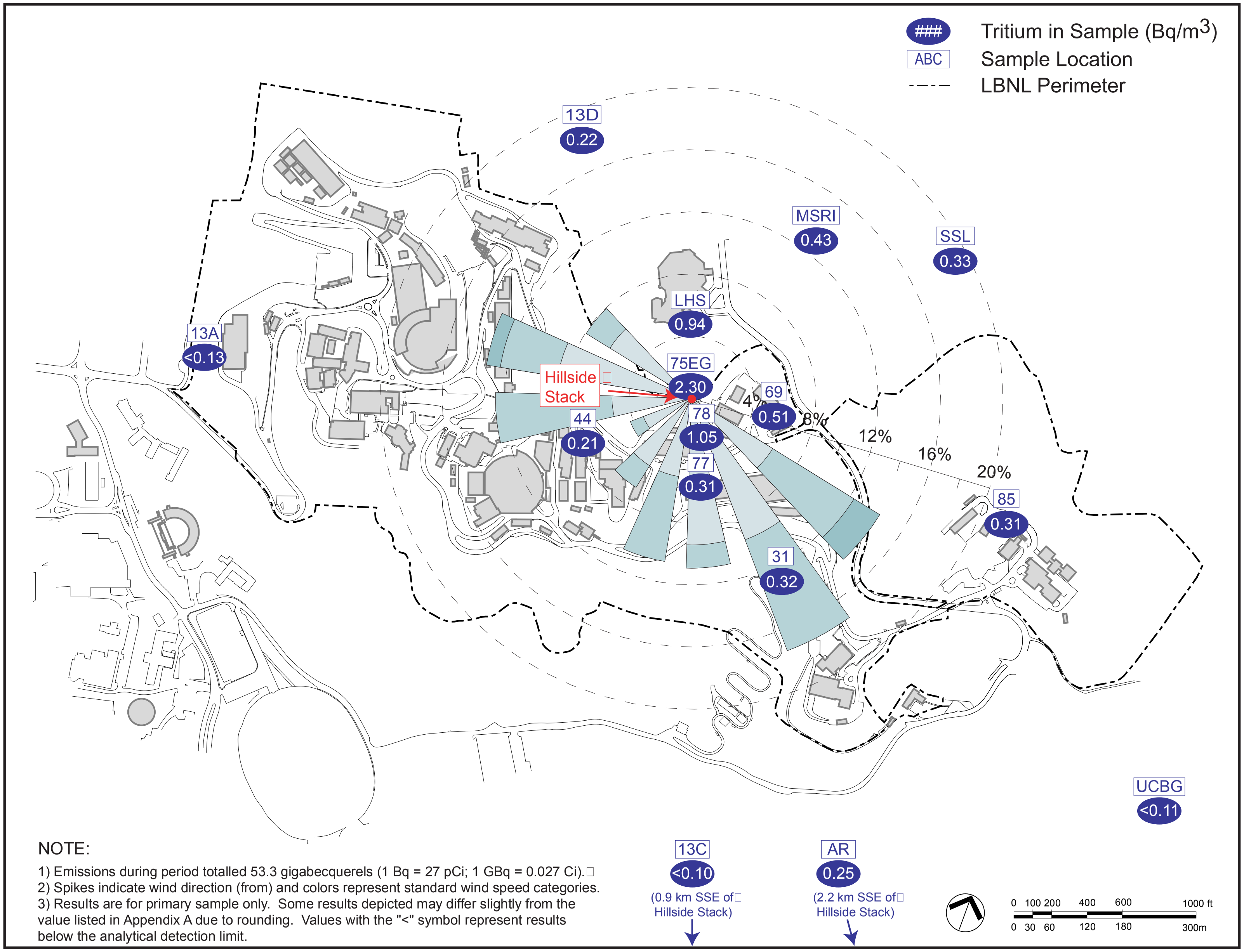
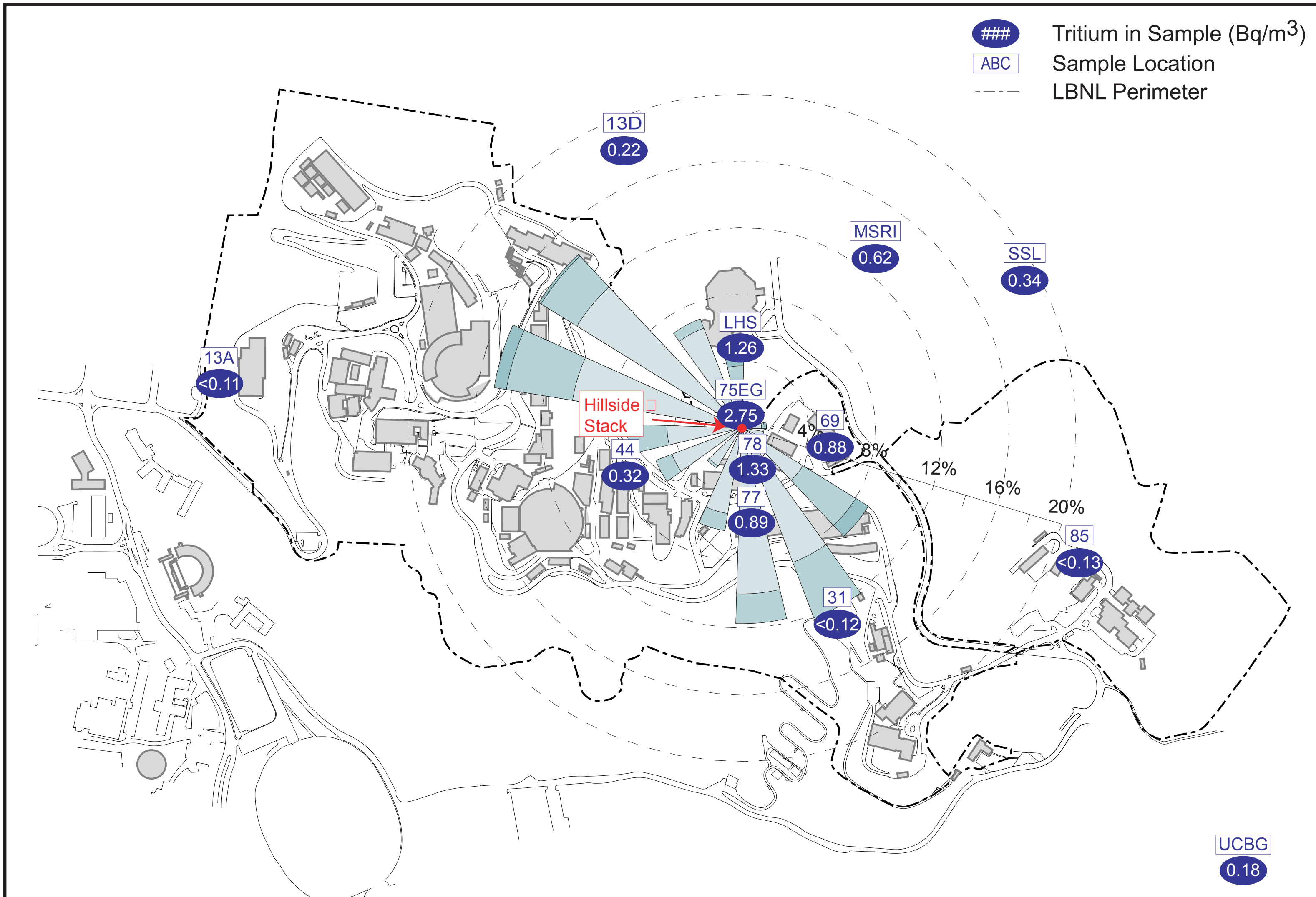


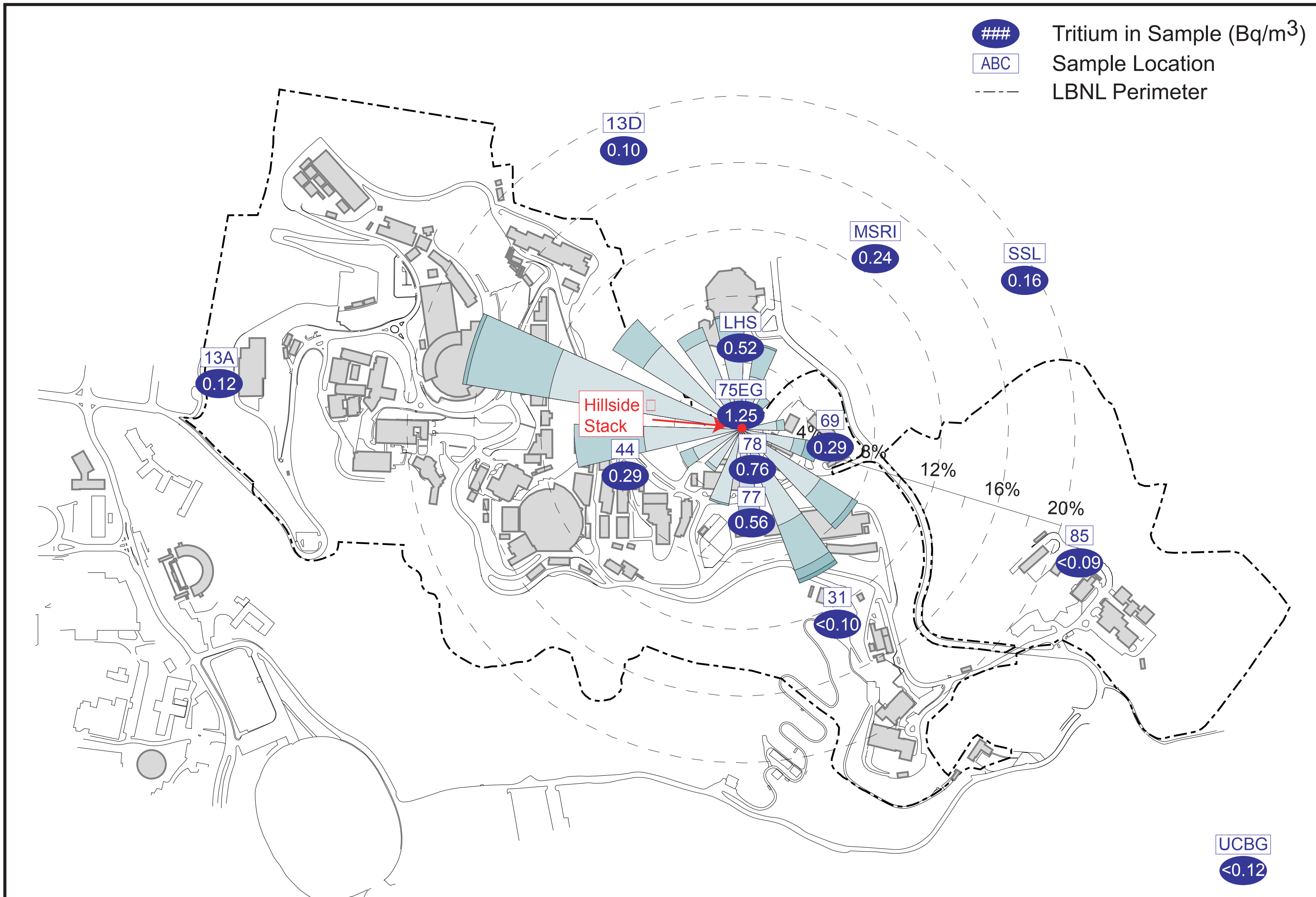
Figure B-4 Ambient Air Tritium (Tritiated Water) Along With Wind Distribution Patterns for Monthly Sampling During August 2001



NOTE:

1) Emissions during period totalled 65.9 gigabecquerels (1 Bq = 27 pCi; 1 GBq = 0.027 Ci).
2) Spikes indicate wind direction (from) and colors represent standard wind speed categories.
3) Results are for primary sample only. Some results depicted may differ slightly from the value listed in Appendix A due to rounding. Values with the "<" symbol represent results below the analytical detection limit.

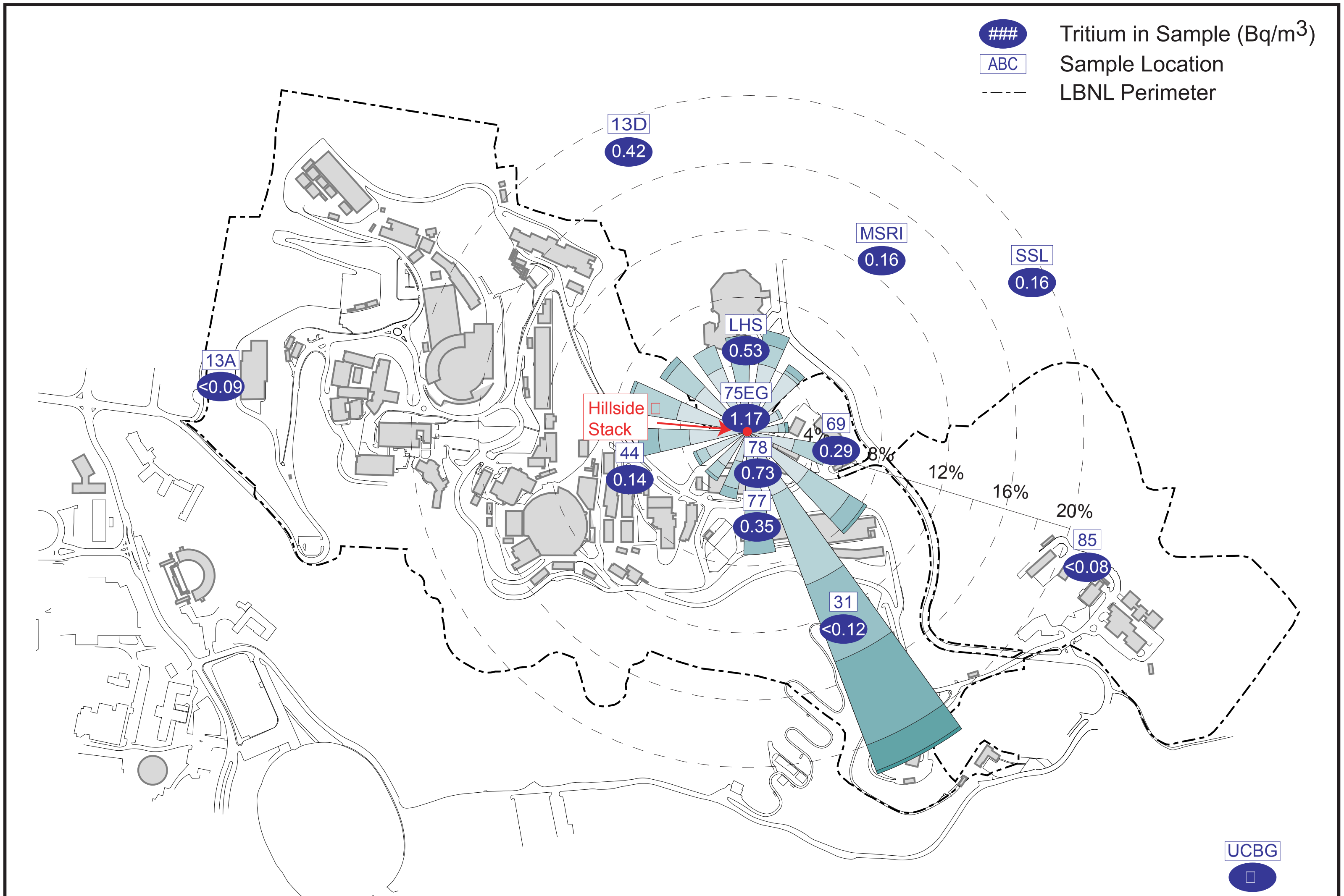
Figure B-5 Ambient Air Tritium (Tritiated Water) Along With Wind Distribution Patterns for Monthly Sampling During September 2001



NOTE:

1) Emissions during period totalled 34.4 gigabecquerels (1 Bq = 27 pCi; 1 GBq = 0.027 Ci).
2) Spikes indicate wind direction (from) and colors represent standard wind speed categories.
3) Results are for primary sample only. Some results depicted may differ slightly from the value listed in Appendix A due to rounding. Values with the "<" symbol represent results below the analytical detection limit.

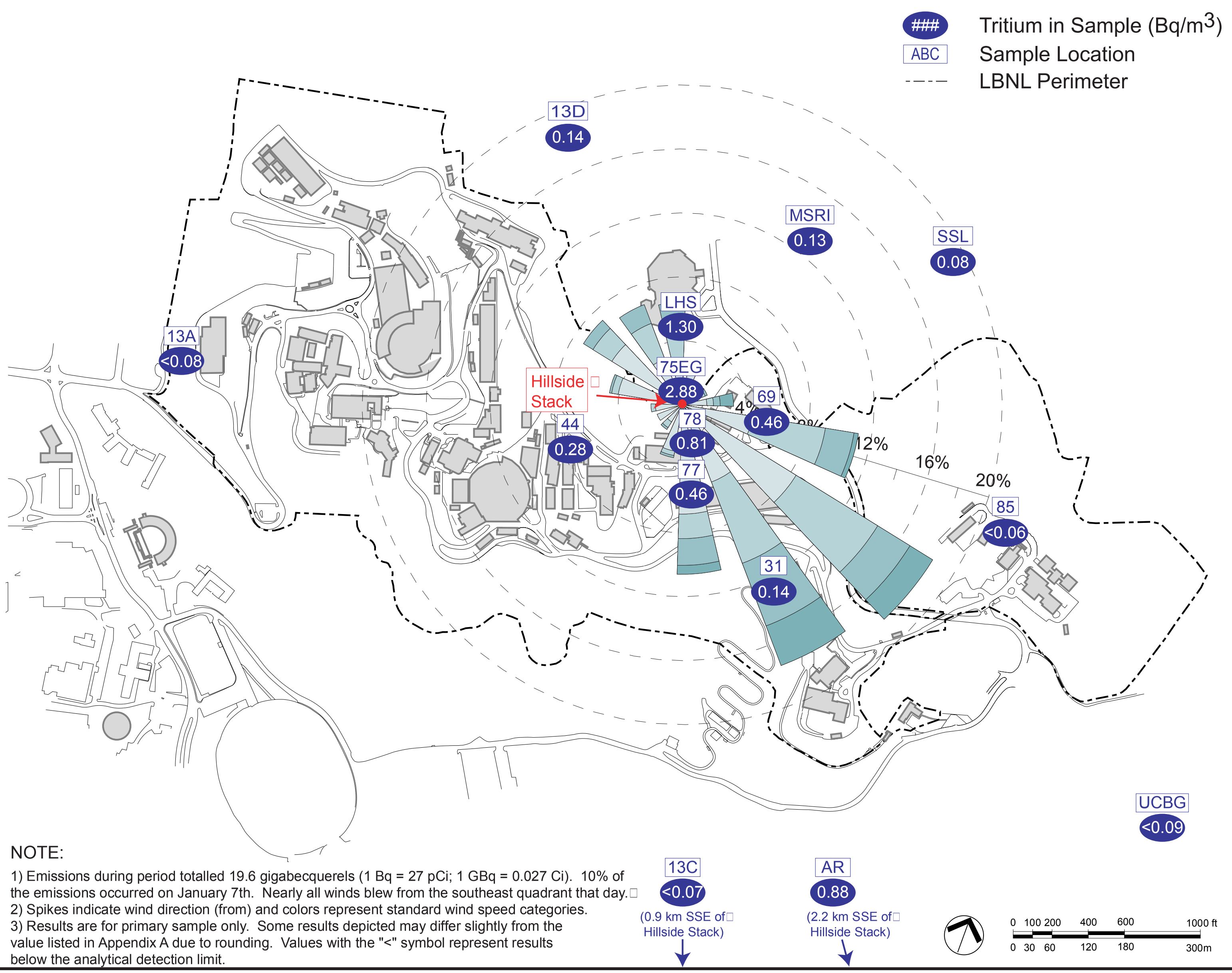
Figure B-6 Ambient Air Tritium (Tritiated Water) Along With Wind Distribution Patterns for Monthly Sampling During October 2001



NOTE:

1) Emissions during period totalled 22.9 gigabecquerels (1 Bq = 27 pCi; 1 GBq = 0.027 Ci).
2) Spikes indicate wind direction (from) and colors represent standard wind speed categories.
3) Results are for primary sample only. Some results depicted may differ slightly from the value listed in Appendix A due to rounding. Values with the "<" symbol represent results below the analytical detection limit.

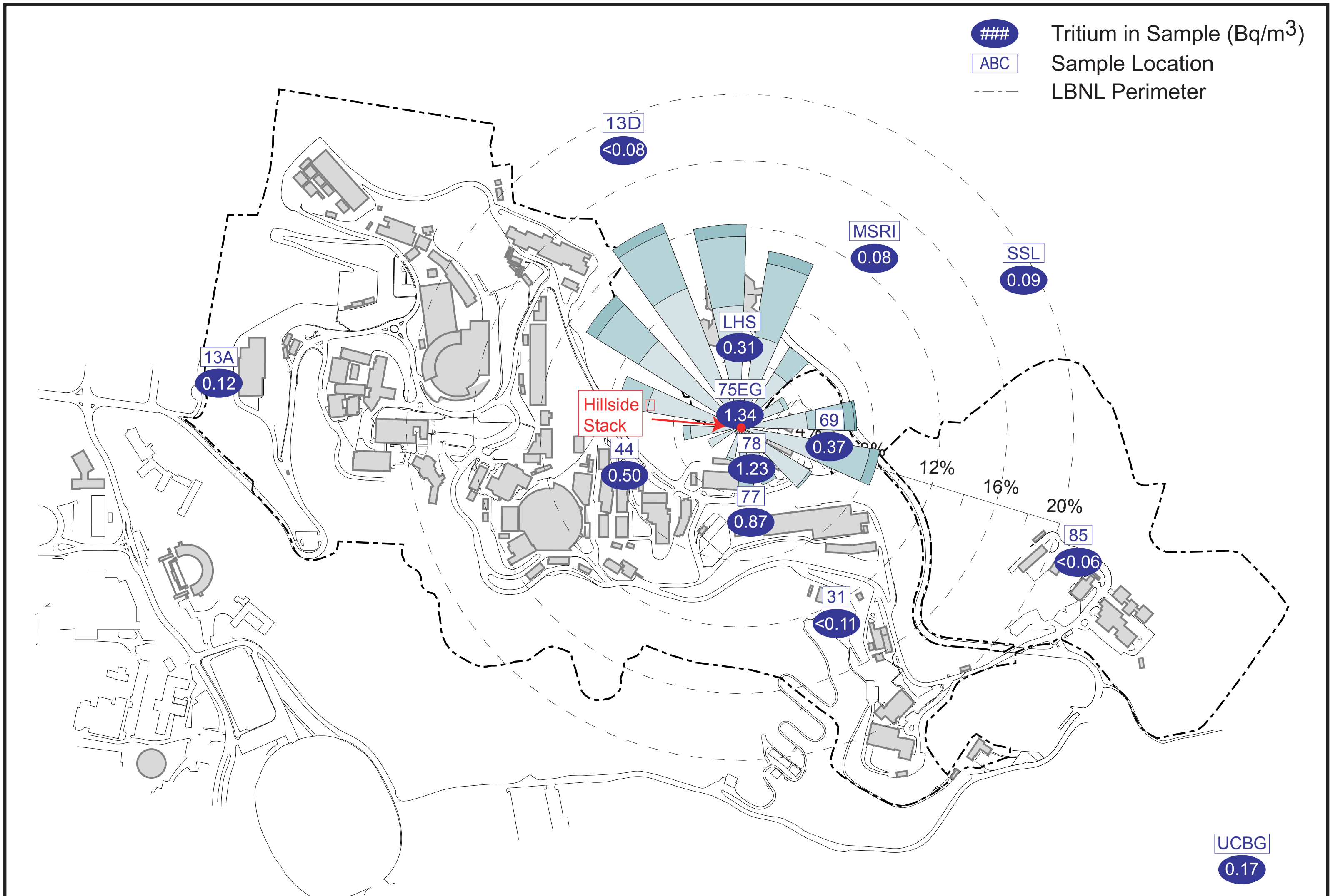
Figure B-7 Ambient Air Tritium (Tritiated Water) Along With Wind Distribution Patterns for Monthly Sampling During November 2001



NOTE:

1) Emissions during period totalled 19.6 gigabecquerels (1 Bq = 27 pCi; 1 GBq = 0.027 Ci). 10% of the emissions occurred on January 7th. Nearly all winds blew from the southeast quadrant that day.
2) Spikes indicate wind direction (from) and colors represent standard wind speed categories.
3) Results are for primary sample only. Some results depicted may differ slightly from the value listed in Appendix A due to rounding. Values with the "<" symbol represent results below the analytical detection limit.

Figure B-8 Ambient Air Tritium (Tritiated Water) Along With Wind Distribution Patterns for Monthly Sampling During December 2001



NOTE:

1) Emissions during period totalled 33.3 gigabecquerels (1 Bq = 27 pCi; 1 GBq = 0.027 Ci).
2) Spikes indicate wind direction (from) and colors represent standard wind speed categories.
3) Results are for primary sample only. Some results depicted may differ slightly from the value listed in Appendix A due to rounding. Values with the "<" symbol represent results below the analytical detection limit.

Figure B-9 Ambient Air Tritium (Tritiated Water) Along With Wind Distribution Patterns for Monthly Sampling During January 2002

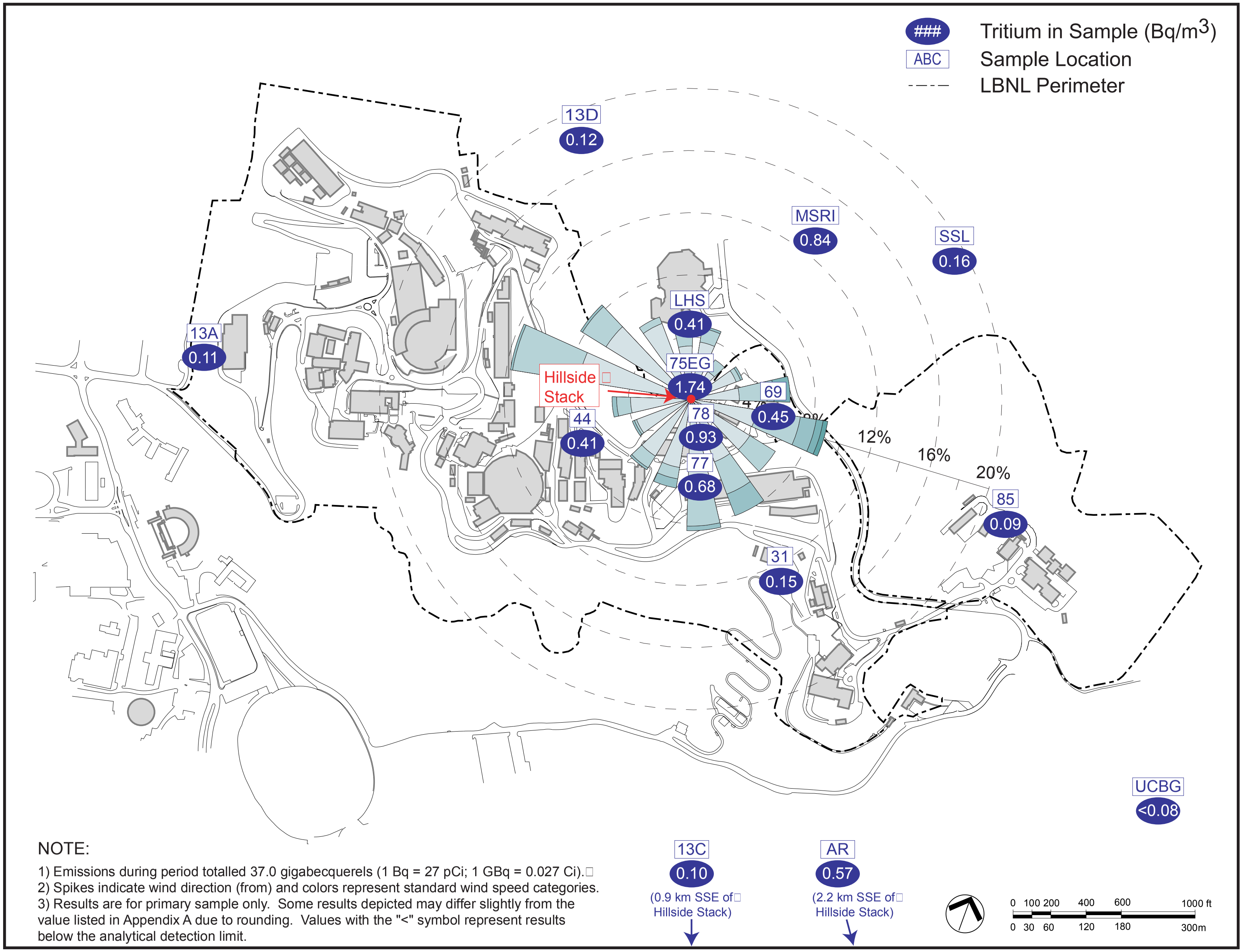
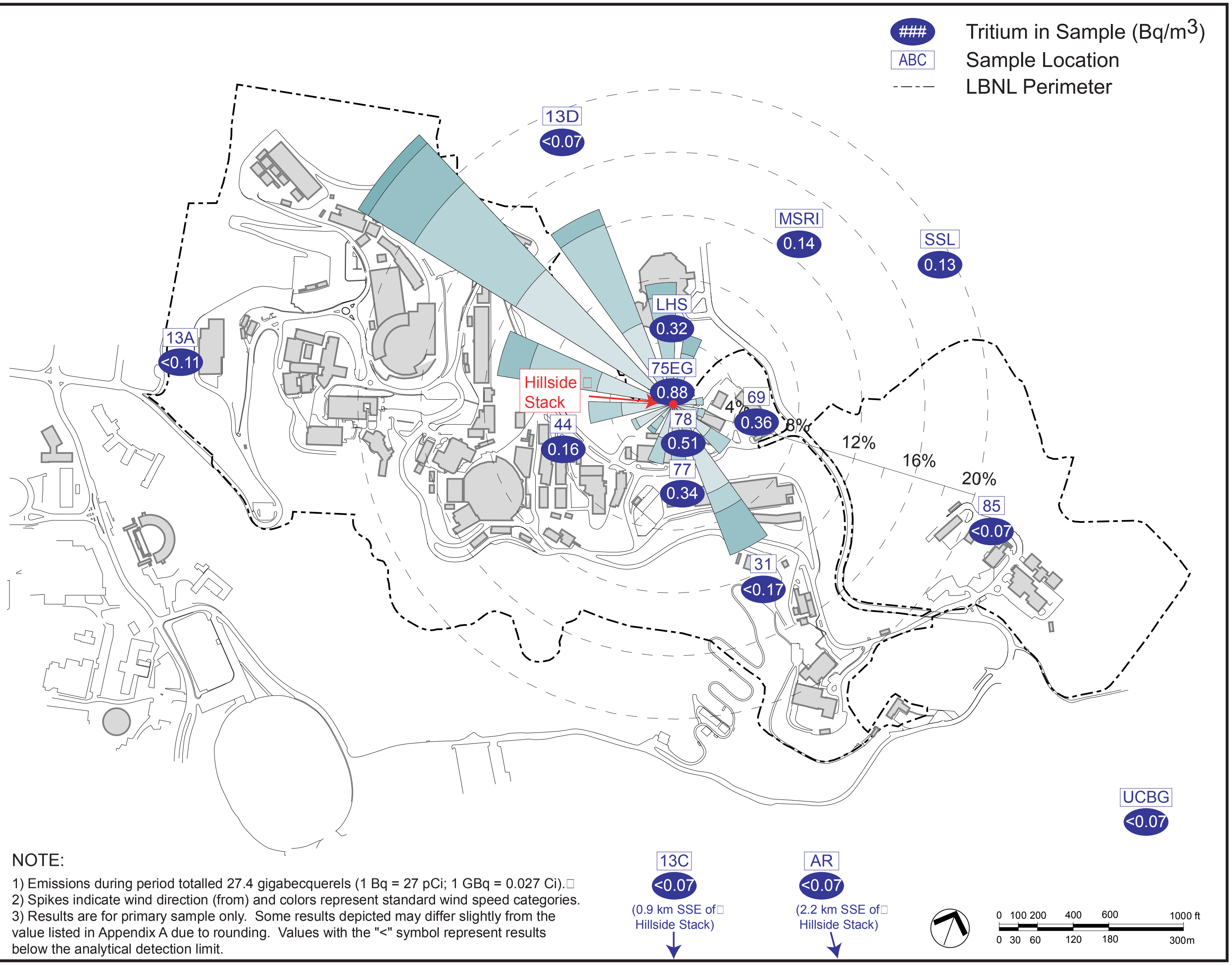


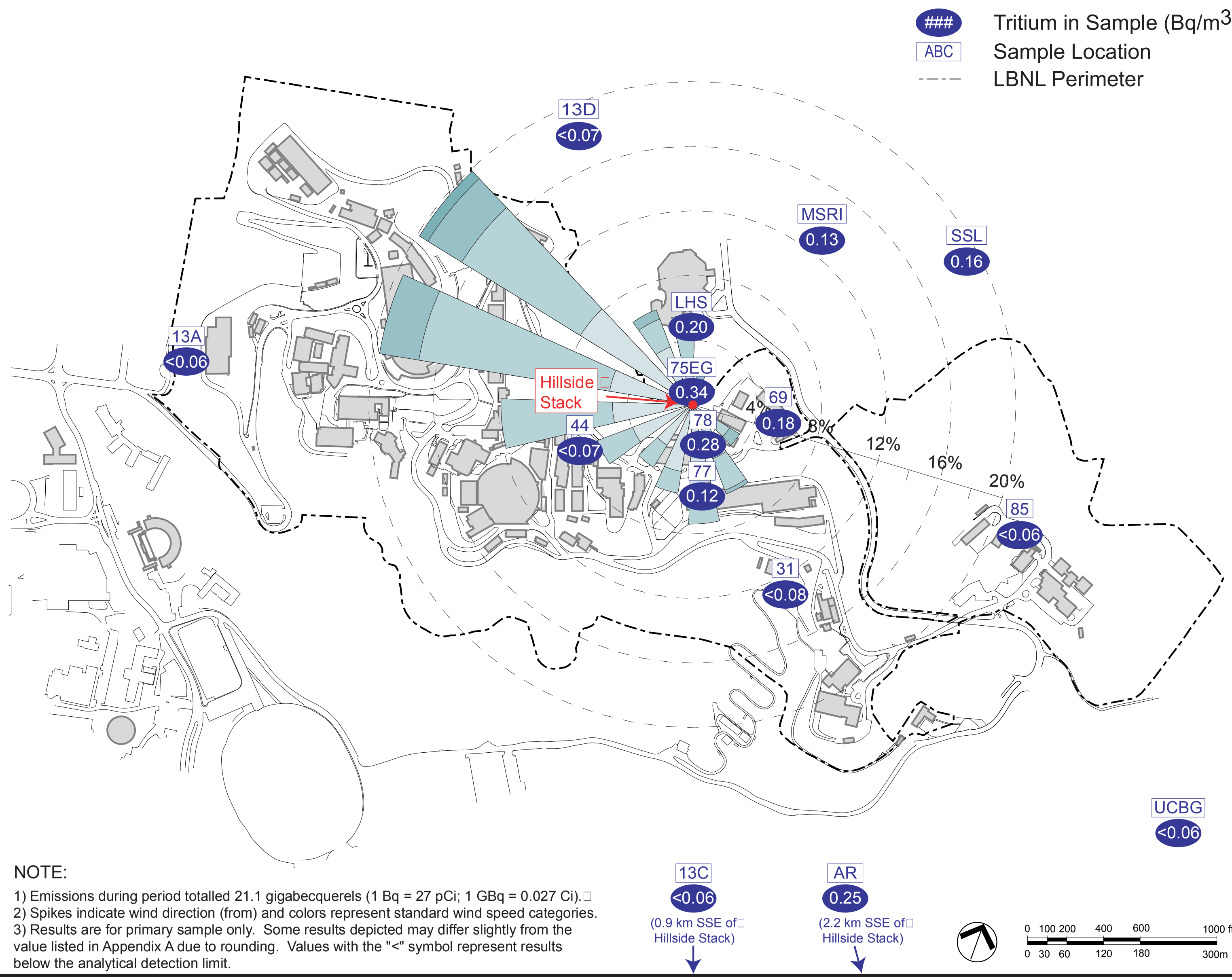
Figure B-10 Ambient Air Tritium (Tritiated Water) Along With Wind Distribution Patterns for Monthly Sampling During February 2002



NOTE:

1) Emissions during period totalled 27.4 gigabecquerels (1 Bq = 27 pCi; 1 GBq = 0.027 Ci).
2) Spikes indicate wind direction (from) and colors represent standard wind speed categories.
3) Results are for primary sample only. Some results depicted may differ slightly from the value listed in Appendix A due to rounding. Values with the "<" symbol represent results below the analytical detection limit.

Figure B-11 Ambient Air Tritium (Tritiated Water) Along With Wind Distribution Patterns for Monthly Sampling During March 2002

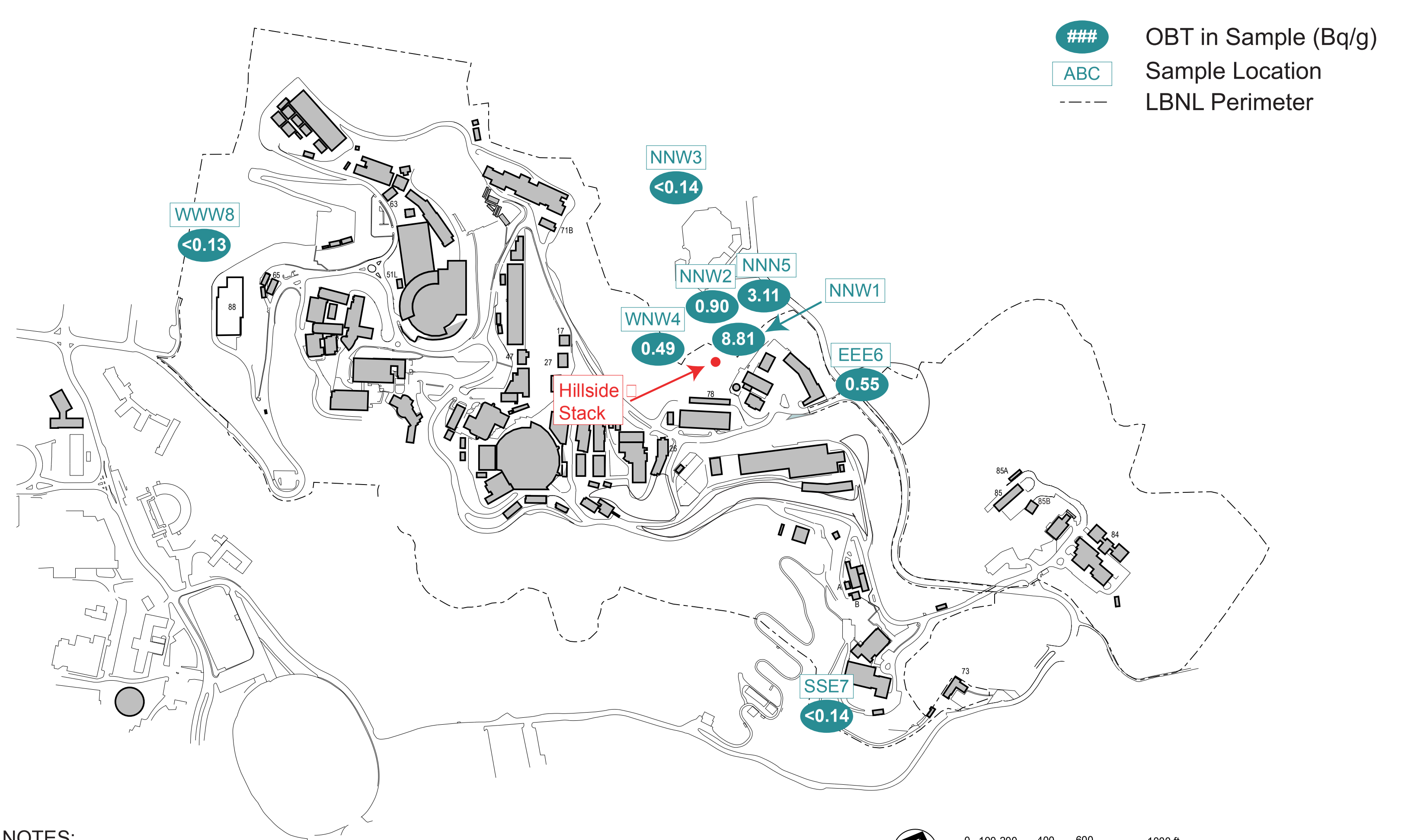


NOTE:

1) Emissions during period totalled 21.1 gigabecquerels (1 Bq = 27 pCi; 1 GBq = 0.027 Ci).
2) Spikes indicate wind direction (from) and colors represent standard wind speed categories.
3) Results are for primary sample only. Some results depicted may differ slightly from the value listed in Appendix A due to rounding. Values with the "<" symbol represent results below the analytical detection limit.

Figure B-12 Ambient Air Tritium (Tritiated Water) Along With Wind Distribution Patterns for Monthly Sampling During April 2002

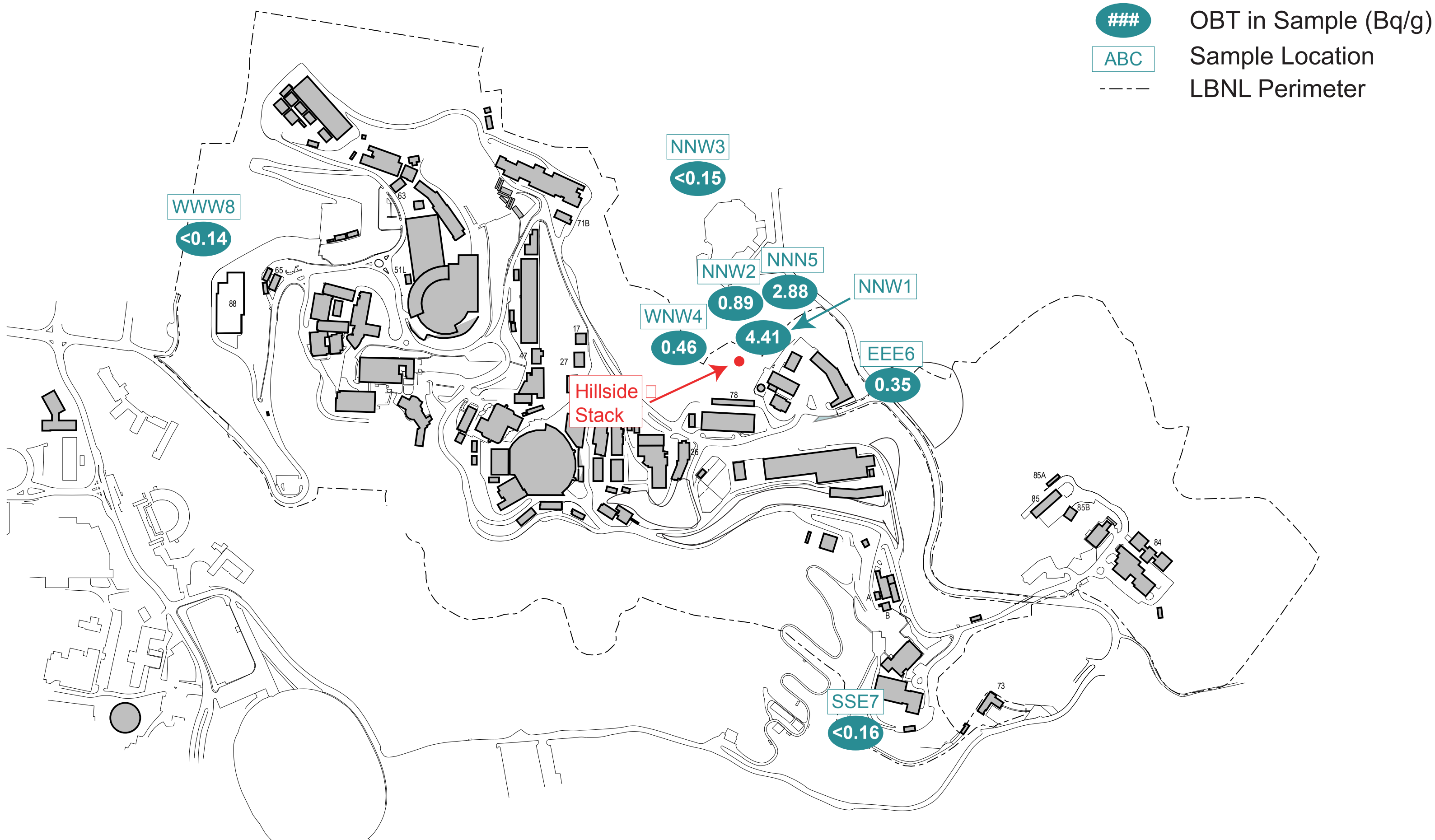
APPENDIX C: VEGETATION TRITIUM RESULTS PLOTTED ON BERKELEY LAB MAPS



NOTES:

1) 1 Bq = 27 pCi.
2) Some results depicted may differ slightly from the value listed in Appendix A due to rounding.
3) Values with the "<" symbol represent results below the analytical detection limit.
4) Results from samples collected at background locations in Tilden and Chabot Regional Parks are not shown.

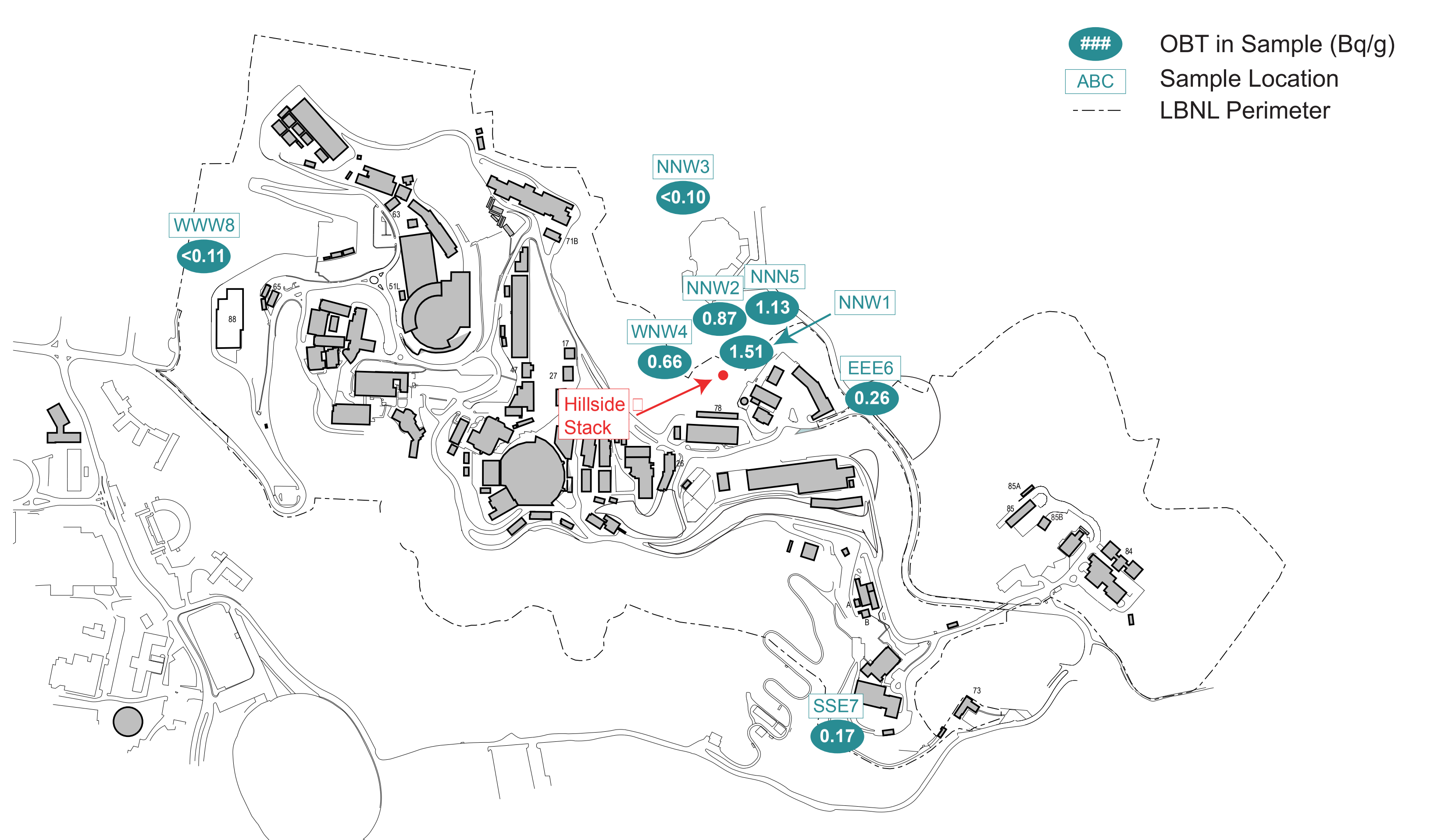
Figure C-1 Organically Bound Tritium (OBT) in Duff During the Dry Season



NOTES:

1) 1 Bq = 27 pCi.
2) Some results depicted may differ slightly from the value listed in Appendix A due to rounding.
3) Values with the "<" symbol represent results below the analytical detection limit.
4) Results from samples collected at background locations in Tilden and Chabot Regional Parks are not shown.

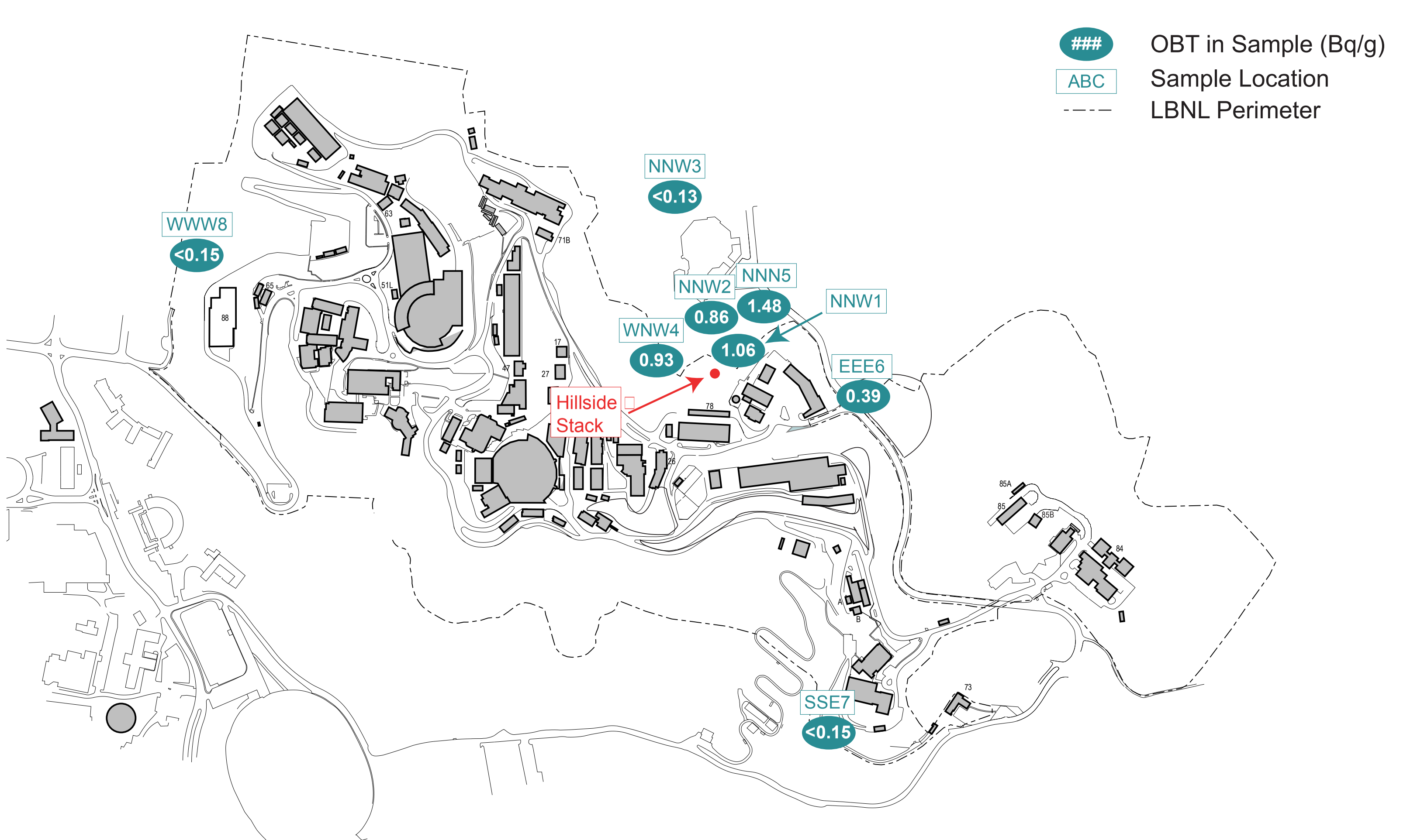
Figure C-2 Organically Bound Tritium (OBT) in Duff During the Wet Season



NOTES:

1) 1 Bq = 27 pCi.
2) Some results depicted may differ slightly from the value listed in Appendix A due to rounding.
3) Values with the "<" symbol represent results below the analytical detection limit.
4) Results from samples collected at background locations in Tilden and Chabot Regional Parks are not shown.

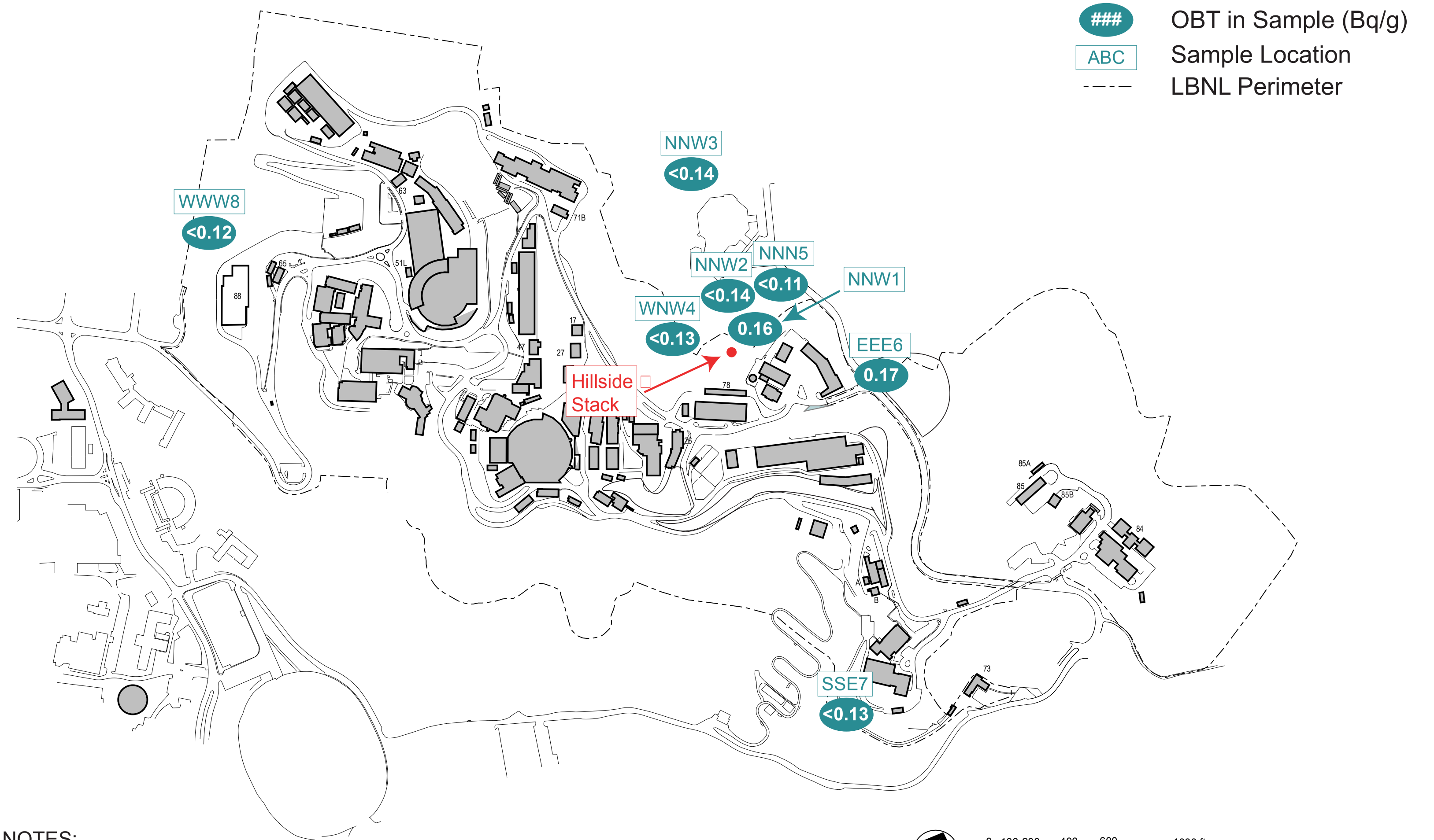
Figure C-3 Organically Bound Tritium (OBT) in Leaves During the Dry Season



NOTES:

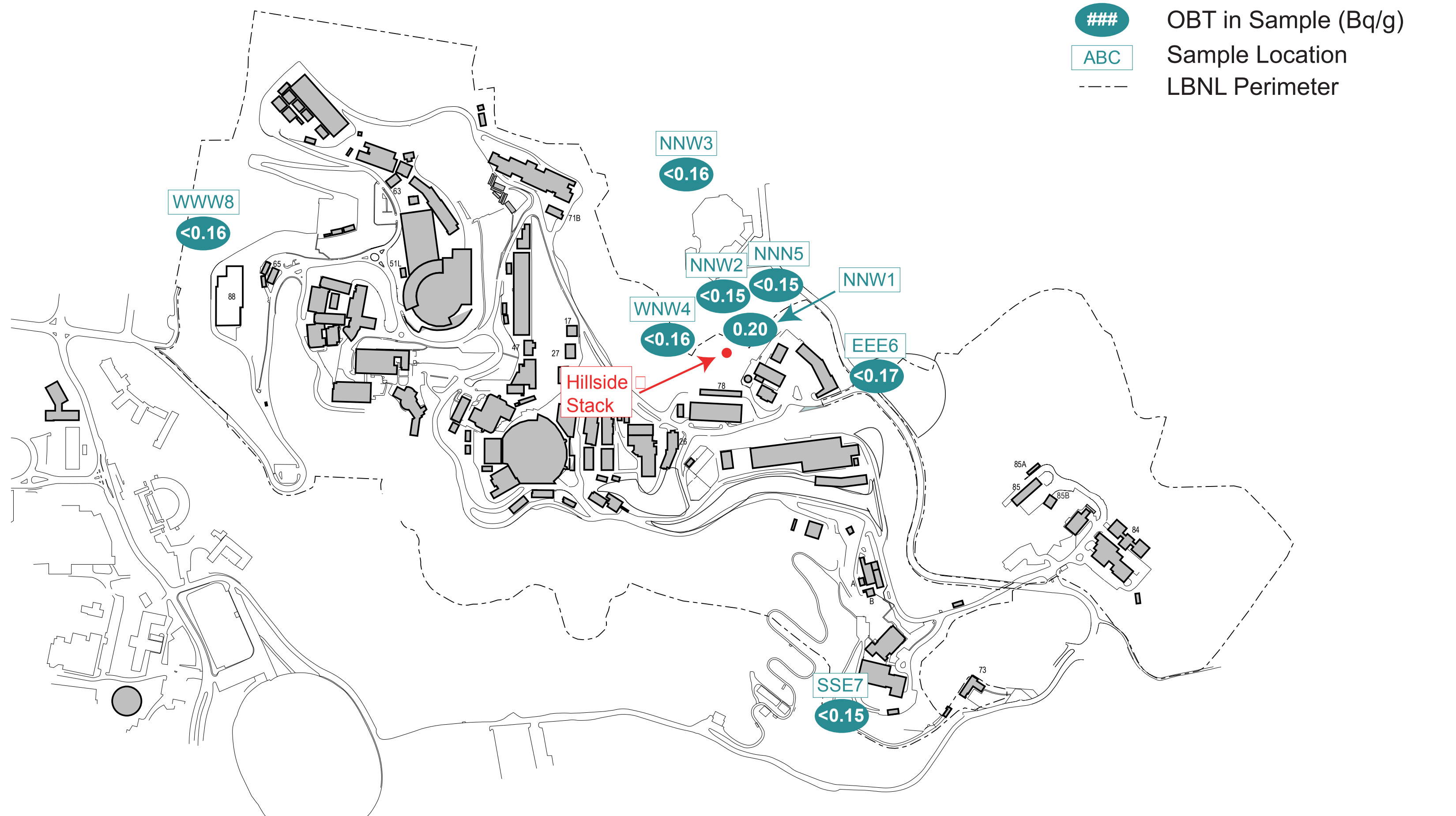
1) 1 Bq = 27 pCi.
2) Some results depicted may differ slightly from the value listed in Appendix A due to rounding.
3) Values with the "<" symbol represent results below the analytical detection limit.
4) Results from samples collected at background locations in Tilden and Chabot Regional Parks are not shown.

Figure C-4 Organically Bound Tritium (OBT) in Leaves During the Wet Season



NOTES:
1) 1 Bq = 27 pCi.
2) Some results depicted may differ slightly from the value listed in Appendix A due to rounding.
3) Values with the "<" symbol represent results below the analytical detection limit.
4) Results from samples collected at background locations in Tilden and Chabot Regional Parks are not shown.

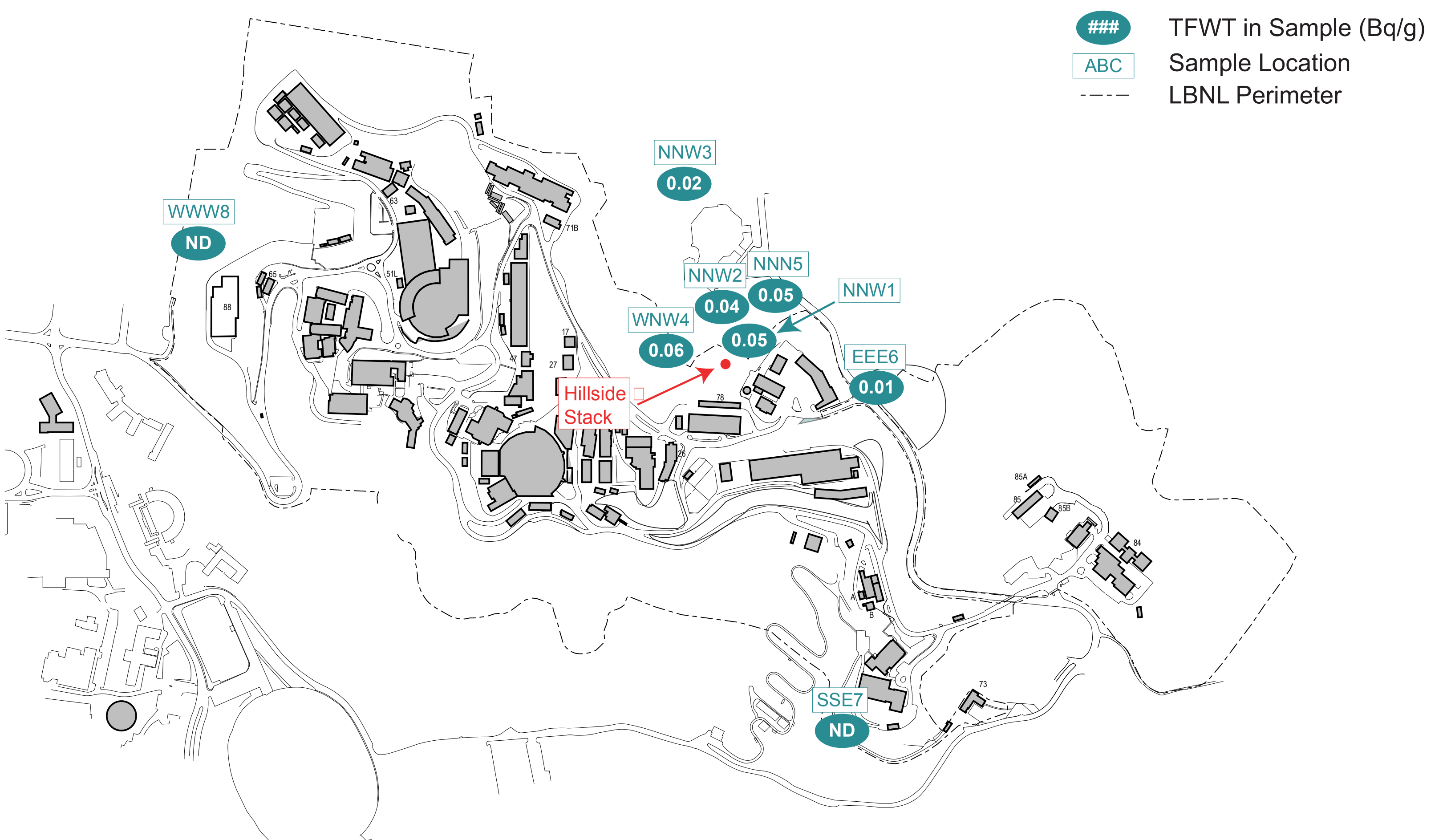
Figure C-5 Organically Bound Tritium (OBT) in Wood During the Dry Season



NOTES:

1) 1 Bq = 27 pCi.
2) Some results depicted may differ slightly from the value listed in Appendix A due to rounding.
3) Values with the "<" symbol represent results below the analytical detection limit.
4) Results from samples collected at background locations in Tilden and Chabot Regional Parks are not shown.

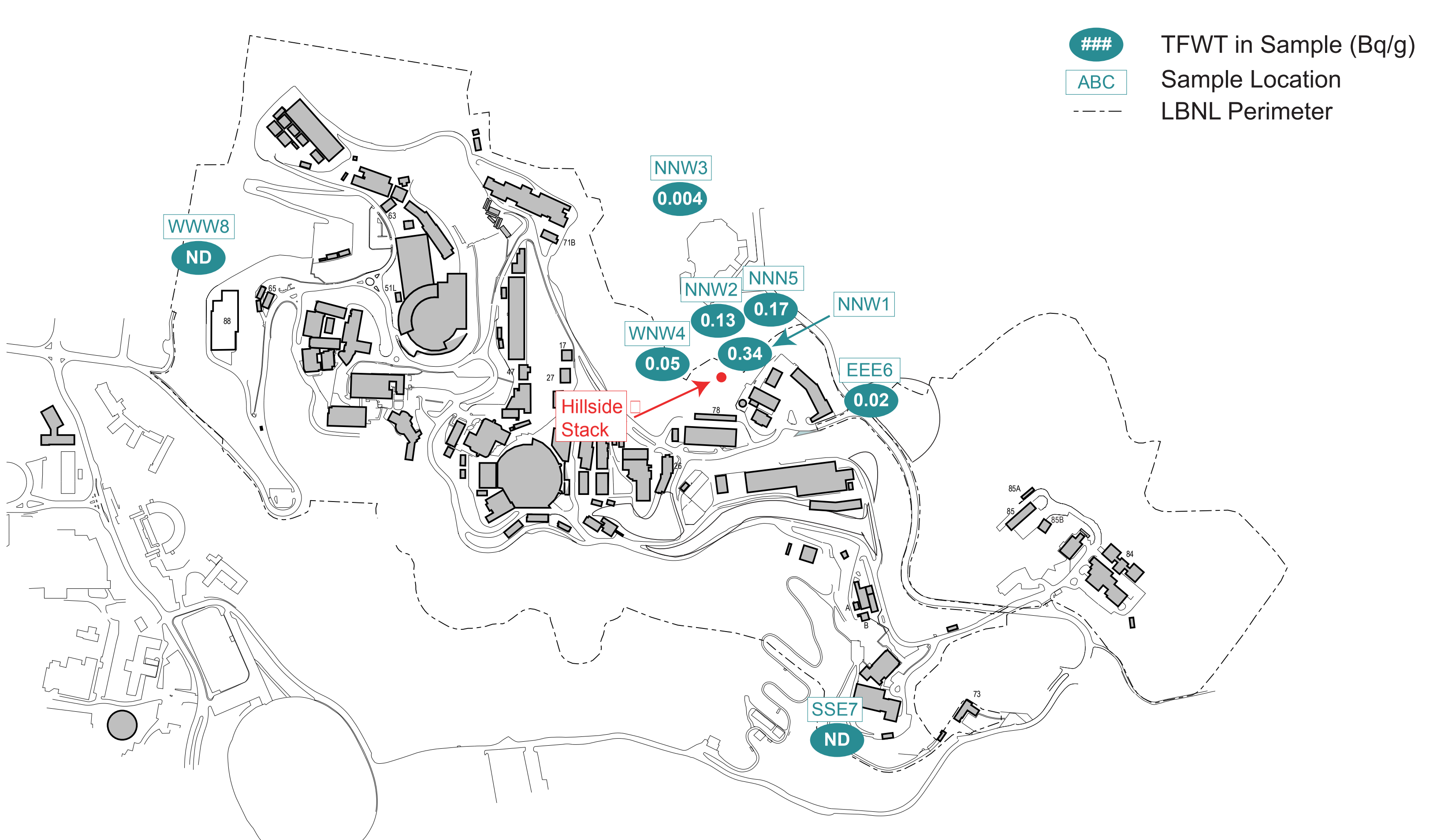
Figure C-6 Organically Bound Tritium (OBT) in Wood During the Wet Season



NOTES:

1) 1 Bq = 27 pCi.
2) Some results depicted may differ slightly from the value listed in Appendix A due to rounding.
3) Values with the "ND" symbol represent results below the analytical detection limit of 0.004 Bq/g.
4) Results from samples collected at background locations in Tilden and Chabot Regional Parks are not shown.

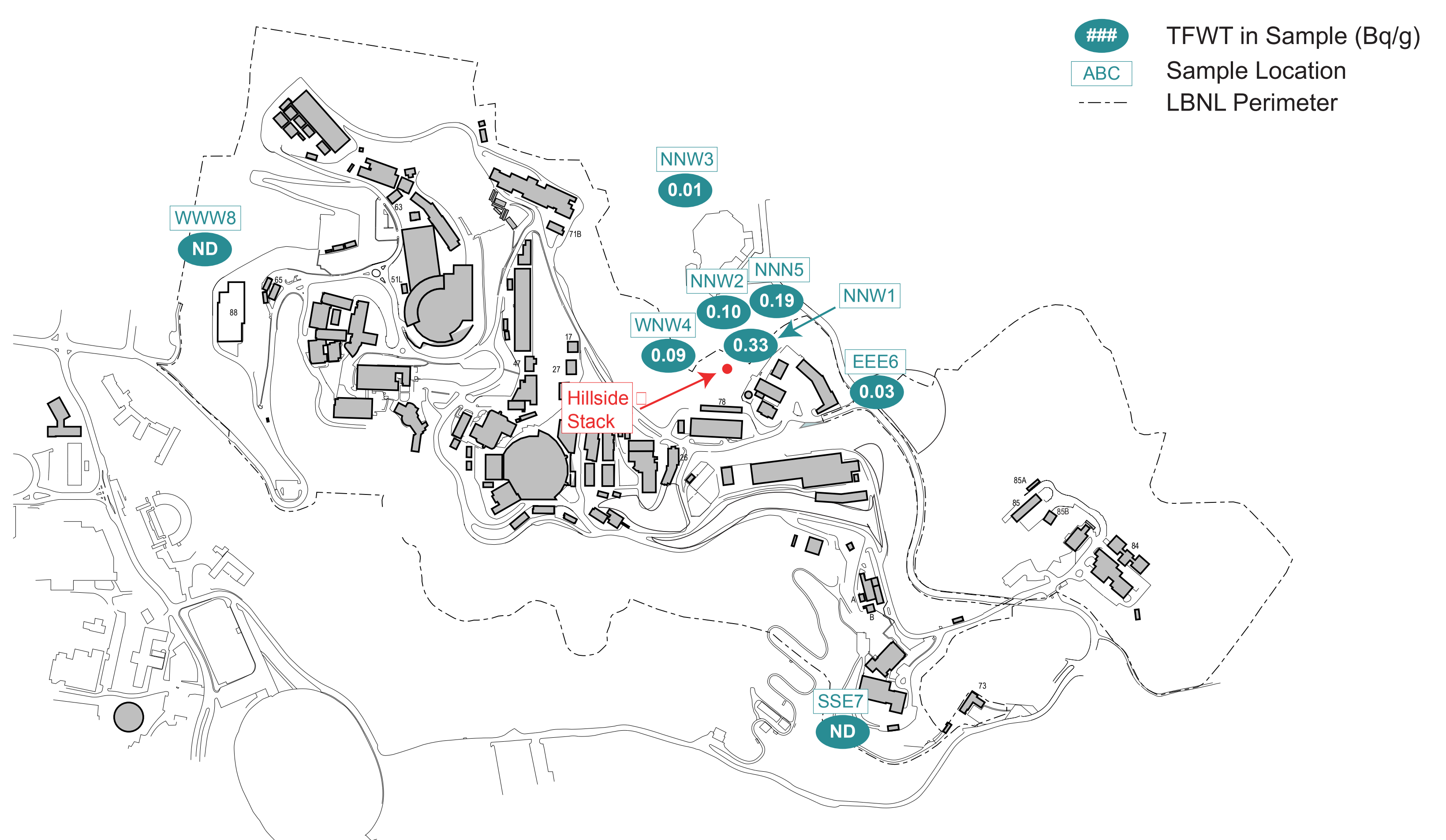
Figure C-7 Tissue-Free Water Tritium (TFWT) in Duff During the Dry Season



NOTES:

1) 1 Bq = 27 pCi.
2) Some results depicted may differ slightly from the value listed in Appendix A due to rounding.
3) Values with the "ND" symbol represent results below the analytical detection limit of 0.005 Bq/g.
4) Results from samples collected at background locations in Tilden and Chabot Regional Parks are not shown.

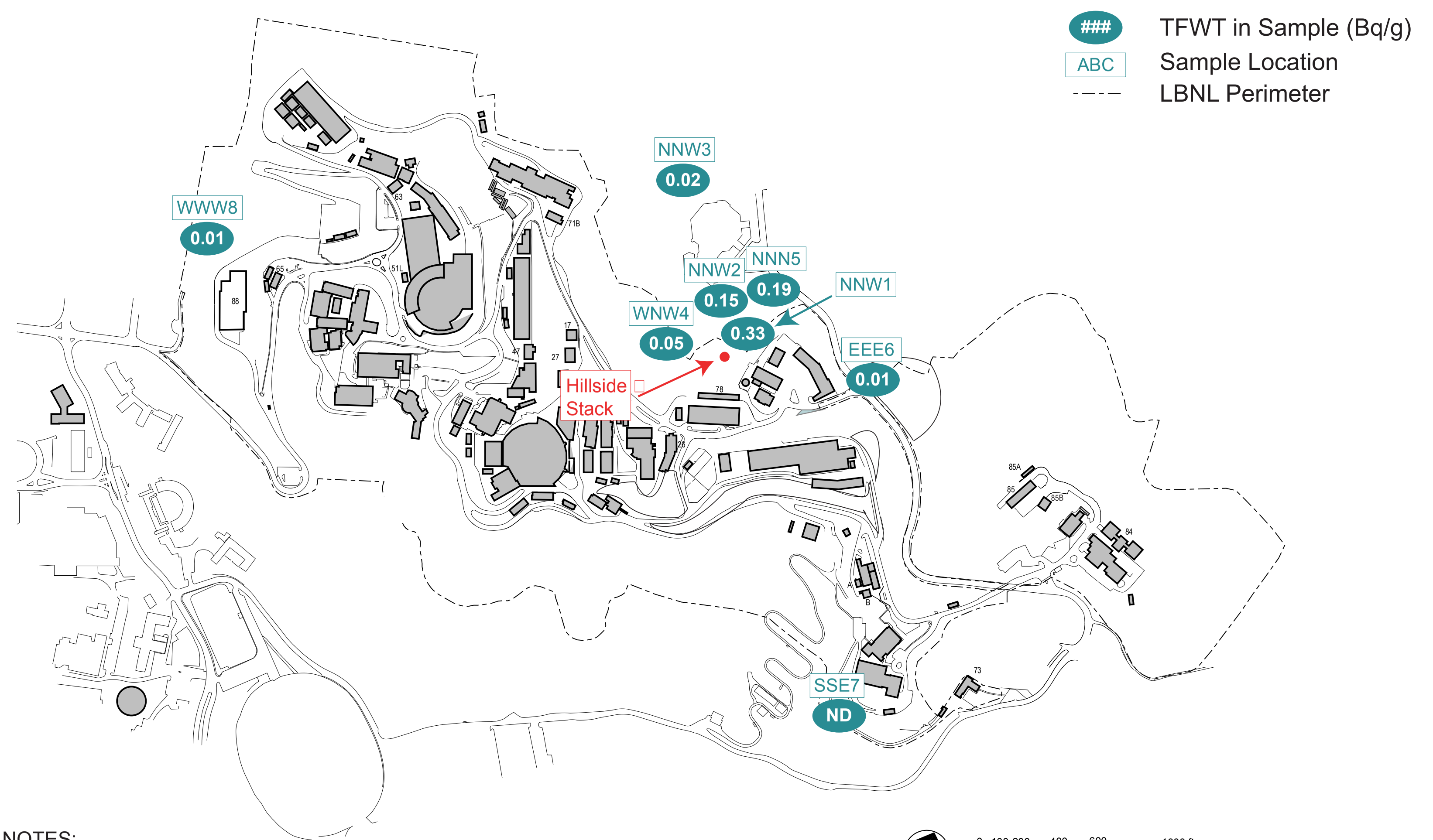
Figure C-8 Tissue-Free Water Tritium (TFWT) in Duff During the Wet Season



NOTES:

1) 1 Bq = 27 pCi.
2) Some results depicted may differ slightly from the value listed in Appendix A due to rounding.
3) Values with the "ND" symbol represent results below the analytical detection limit of 0.005 Bq/g.
4) Results from samples collected at background locations in Tilden and Chabot Regional Parks are not shown.

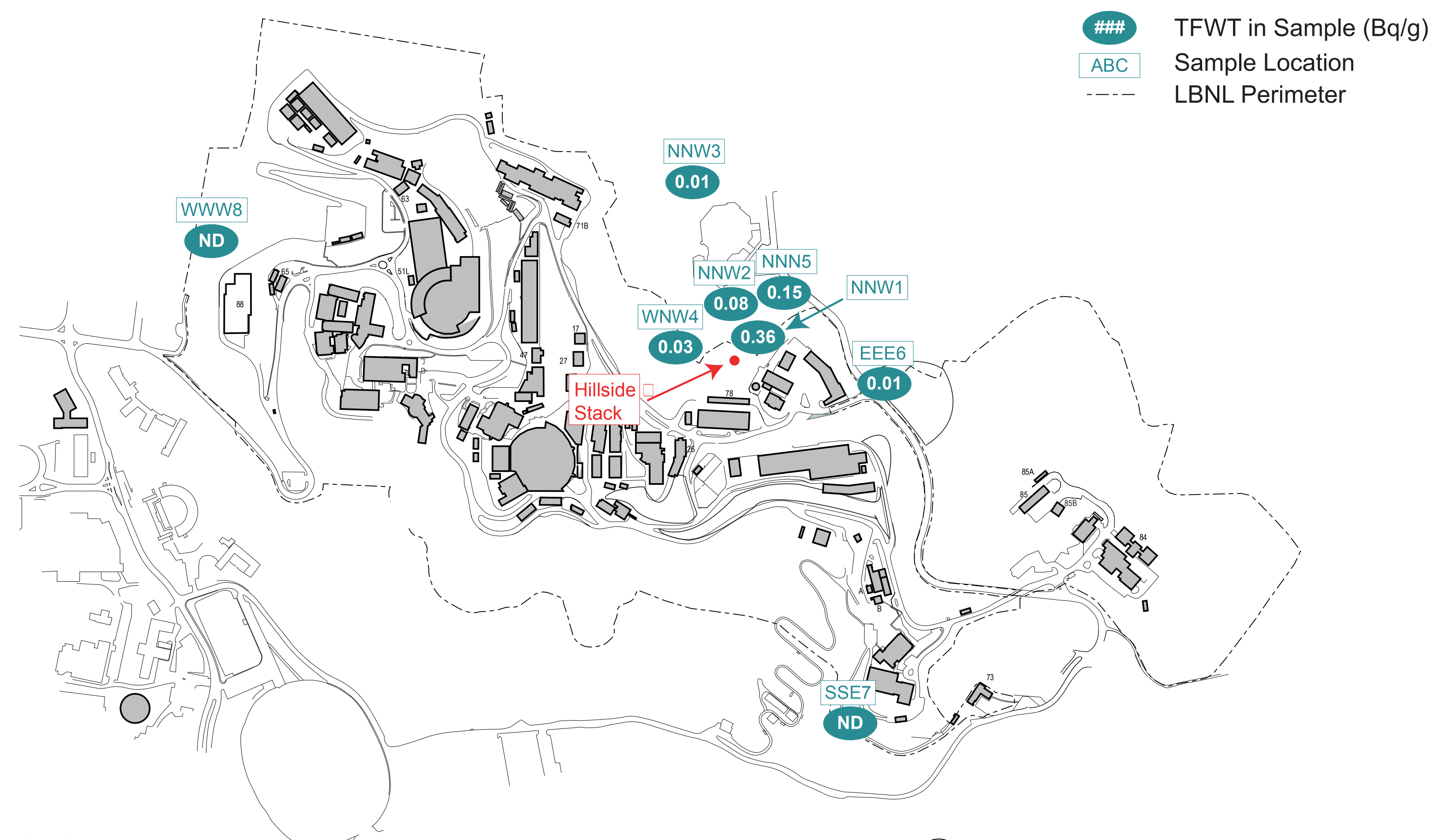
Figure C-9 Tissue-Free Water Tritium (TFWT) in Leaves During the Dry Season



NOTES:

1) 1 Bq = 27 pCi.
2) Some results depicted may differ slightly from the value listed in Appendix A due to rounding.
3) Values with the "ND" symbol represent results below the analytical detection limit of 0.005 Bq/g.
4) Results from samples collected at background locations in Tilden and Chabot Regional Parks are not shown.

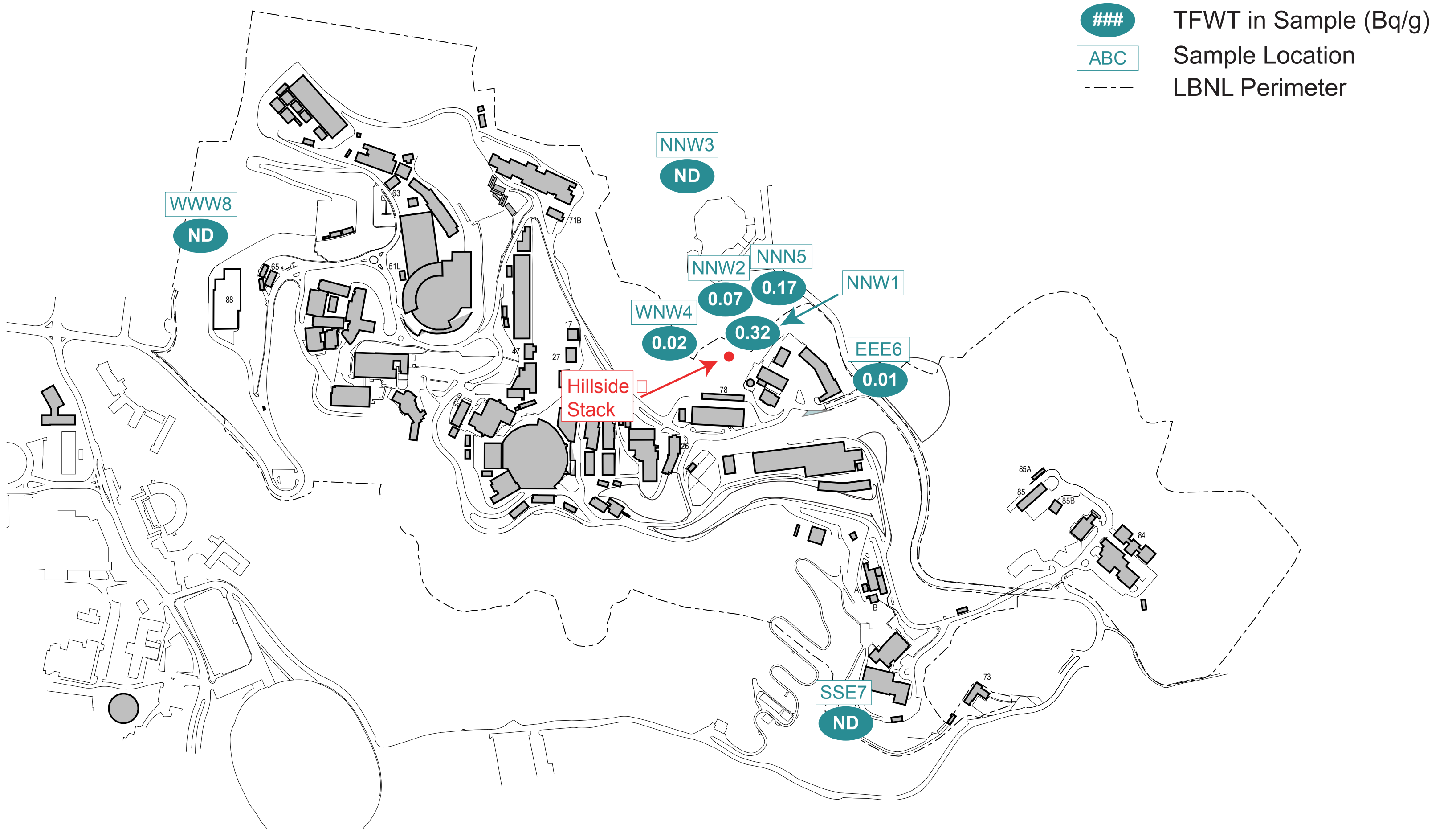
Figure C-10 Tissue-Free Water Tritium (TFWT) in Leaves During the Wet Season



NOTES:

1) 1 Bq = 27 pCi.
2) Some results depicted may differ slightly from the value listed in Appendix A due to rounding.
3) Values with the "ND" symbol represent results below the analytical detection limit of 0.005 Bq/g.
4) Results from samples collected at background locations in Tilden and Chabot Regional Parks are not shown.

Figure C-11 Tissue-Free Water Tritium (TFWT) in Wood During the Dry Season



NOTES:
1) 1 Bq = 27 pCi.
2) Some results depicted may differ slightly from the value listed in Appendix A due to rounding.
3) Values with the "ND" symbol represent results below the analytical detection limit of 0.005 Bq/g.
4) Results from samples collected at background locations in Tilden and Chabot Regional Parks are not shown.

Figure C-12 Tissue-Free Water Tritium (TFWT) in Wood During the Wet Season

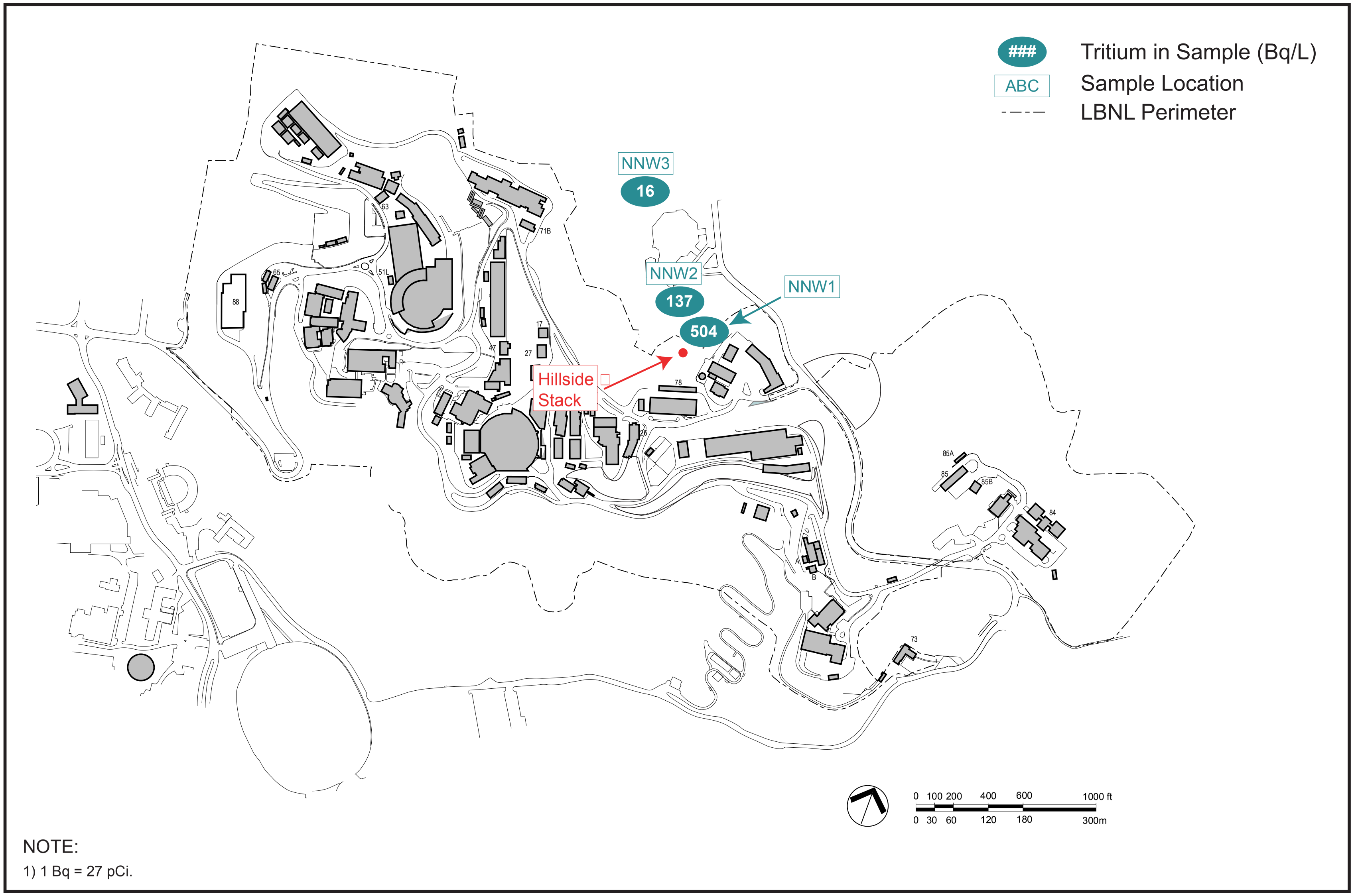


Figure C-13 Tritium in Transpired Water During the Dry Season

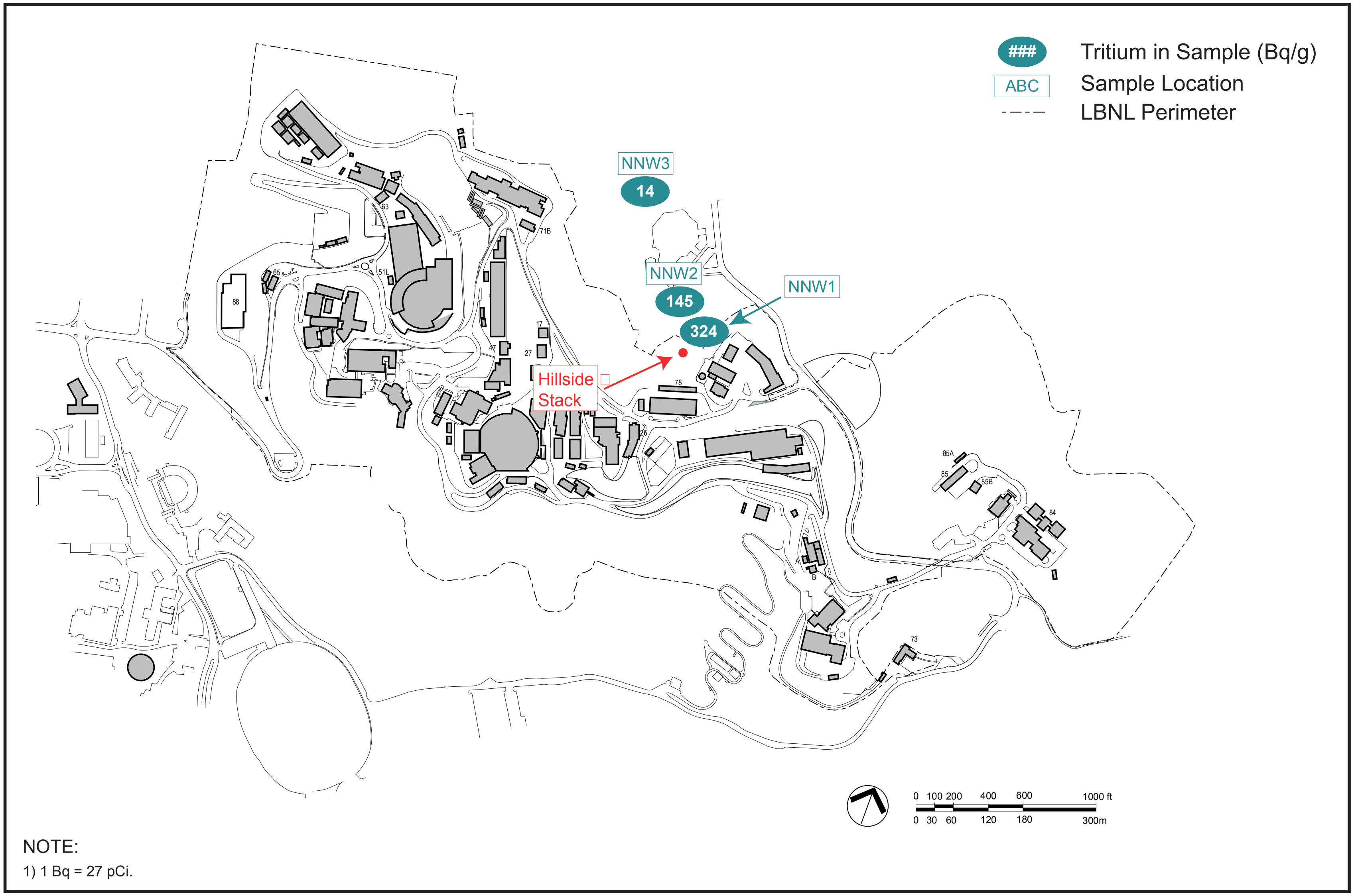


Figure C-14 Tritium in Transpired Water During the Wet Season